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The
**International Journal of
Orthodontia**
Oral Surgery and Radiography

*A Monthly Journal Devoted to the Advancement of
the Sciences of Orthodontia, Oral Surgery
and Dental and Oral Radiography*

Editor

Martin Dewey, D.D.S., M.D., F.A.C.D., New York

H. C. Pollock, D.D.S., St. Louis, Associate Editor

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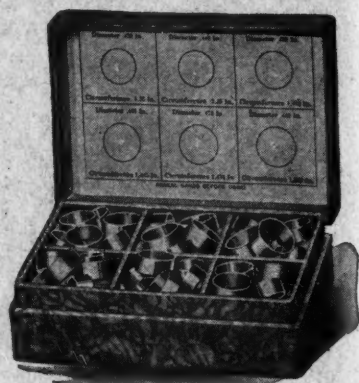
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The International Journal of Orthodontia, Oral Surgery and Radiography

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VOL. XIV

ST. LOUIS, JULY, 1928

No. 7

ORIGINAL ARTICLES

WHY CAN TEETH BE MOVED SAFELY?*

BY JOSEPH D. EBY, D.D.S., NEW YORK, N. Y.

IT IS an unusual opportunity to have the privilege, in conjunction with my associates, to address this distinguished audience, even so briefly on subjects relating to the modern status and trend of the science of orthodontia.

Conceived as it was in hypothetical reasoning, based on the obscure observation that teeth would move, and nurtured from the bosom of mechanics, each period of orthodontic progress carried the heritage of preceding decades, and thus evolution has held a real benefaction to humanity in the making.

Thousands of dentists have labored behind this veil of obscurity and staggered under the load of ignorance. In their struggle to commandeer the unknown laws of Nature into a desired response by the forces of contrivances, produced by their ingenuity or suggestion, that have invited damage or failure as the result of their efforts.

Among these thousands of doctors of dental surgery, certain individuals have discovered atoms of solid facts in this nebulous mass, and brought them for the building of a belated foundation. At first old superstructures of belief and practice were elevated to make way for the new foundations. To-day it is only too apparent that the framework of future knowledge will completely transform the old architecture, working through it, using this bit of valuable material here, that bit there—forging upward into that era of new enlightenment which with only dim vision seems to presage the early dawn of a bright future.

In the spring of 1922, Sir Arthur Keith and Dr. George G. Campion found that they were investigating the growth of the face by different meth-

*Read before the New York Society of Orthodontists, New York City, Dec. 14, 1927.

ods. Dr. Campion was measuring growth from fixed points at "succeeding age periods." Sir Arthur Keith was in search of findings by the study of "immature and mature" skulls to determine the sites at which growth takes place. In a joint paper entitled "A Contribution to the Mechanism of Growth of the Human Face," they prepared an addition to science and literature which should be fresh in the minds of every doctor of dentistry.

In an essay entitled "Changes in the Human Face Brought About by Development," Dr. Milo Hellman delivered one of the classics of his career. The results of his vast studies roughly expressed are, that the face is projected downward and forward, broadening on the posterior base, and with constant changes varying as to type, governed by function and environment, develops in all planes of space. To quote Dr. Hellman from the conclusions of his essay, he states the following:

"The facts revealed by this study should make one wary of several things:

1. "The very complex nature of development as it concerns the human face.

2. "The efficiency with which this process has been attended to for hundreds of thousands of years without the aid of orthodontic appliances.

3. "The great care necessary to determine just *when* these natural phenomena are in need of assistance.

4. "The risk of attempting to do something with orthodontic appliances that might be accomplished in the course of time by natural development."

Dr. Neustadt in a paper entitled, "The Growth of Bone as Related to Function," makes the following statement:

"In relating form to function the *extrinsic* factor only can be studied in experiments, and its influence seen in the treatment of patients. But the *intrinsic* factor should not be entirely forgotten.

"The intrinsic factor is laid down by the function that the organ has performed for thousands of years during the life of our ancestors.

"Only those qualities which are of advantage to normal functional acts are transmitted, and we inherit a latent endeavor of our jaws to develop in the way they will be most useful to us.

"Every treatment which tries to establish the optimal jaw form is greatly helped by this inner power."

Dr. Neustadt illustrates very beautifully the difference in the osseous arrangements around teeth which were in function and those which were not. His concluding paragraph contains a very impressive thought, which is:

"From the problem, function and growth, develops the problem, function and health."

When these vital factors engaged in normal production are invaded abnormality results. Teeth can only be moved safely in the correction of malocclusion by those orthodontic procedures which recognize and assist the tissues in overcoming the disadvantages to which they have been exposed.

All tissue presents the collective conditions of the constituent cells. A fundamental biologic law relates to the irritation vs. the stimulation of cellular tissue. If the teeth and dental arches are incarcerated in mechanical con-

trivances from which they cannot extricate themselves and are forced to take the punishment, then they cannot be moved safely. If all the works of these noted investigators are to be ignored or refuted, then teeth cannot be moved safely.

To move teeth safely is to:

1. Be familiar with all that makes for normal.
2. Be alert to appreciate the invading cause of abnormality and its effects.
3. Be willing to allow Nature the benefit of doubt.
4. Only render the assistance required, at the proper time, of the proper kind—and no more.
5. Realize that any treatment must be prescribed by apparent facts and not approached under empirical uncertainty.
6. Conceive that biological rules, not mechanical appliances move teeth.

It is my belief that through the knowledge of tissue changes and the phenomena of growth we should recognize the types of mechanical devices which are consistent with or contrary to the governing laws of physiology. At the present time the differences between right and wrong methods of treatment are known to most orthodontists, but, for various reasons are not altogether admitted or practiced. Correct principles of treatment should be circumscribed within certain vested facts, beyond the boundaries of which no appliances, regardless of their sponsorship should be recognized.

In view of the above biologic facts, it is my belief that among those principles of treatment which will survive the test of time, the methods of anchorage and applied stimulation of lingual and labial arch combinations, with auxiliary springs will be found within the realm of correct therapy in orthodontia. These are some of the reasons why teeth move into normal occlusion, why they develop malocclusion, or may be moved safely.

Alumni Society of the Dewey School of Orthodontia

The Alumni Society of the Dewey School of Orthodontia will hold its Annual Meeting at the Hotel Vanderbilt, New York City, on August 6, 7, and 8, 1928.

A very interesting scientific program has been arranged. An Alumni Dinner will be held on August 6, 1928.

Wyatt B. Childs, Pres.

Harry A. Holder, Secy.

NORMAL AND ABNORMAL DECIDUOUS DENTITIONS*

BY LEONARD M. GUNTON, PH.G., D.D.S., NEW YORK CITY

THE subject delegated to me, following Dr. Eby's concise review of the fundamental principles of growth and development, and the reasons why teeth can be safely moved is—"Normal and Abnormal Deciduous Dentitions."

In the briefest possible manner we will consider the present trend of thought in regard to these deciduous dentures; and also conditions as a whole

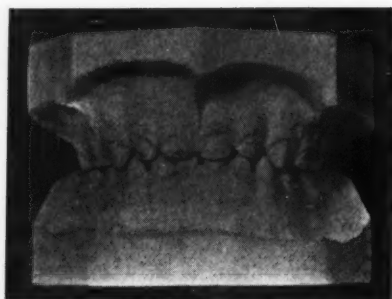


Fig. 1



Fig. 2.

as seen to exist in these cases ranging from four to seven years of age, or until the eruption of the first permanent molars, or possibly one or two permanent incisors.

At the age of two, when usually all the deciduous teeth are in place and each one in contact with its neighbor, we advance to the age of four to five, when it will be noticed that spacing is beginning to occur between the anterior teeth. These growth spaces become larger and are merely a phase in the development and growth of the deeper structures, such as the palatal, nasal and facial bones, the bones of the maxilla and the mandible, and show Nature's way of preparing in advance for the permanent and larger denture when the time comes for its arrival. These spacings are the result, not merely of a widening in the anterior region alone, but in the molar region also, in fact, a distinct enlargement of the circumference of the arch.

*Read before the New York Society of Orthodontists, New York City, Dec. 14, 1927.

Fig. 1 shows these spaces very clearly, and you will notice also the almost edge-to-edge bite at this period.

Fig. 2 of the same case shows the wide curve, the shallow arch, the generous space distal to the molars and the beautiful symmetry denoting growth and development.

Figs. 3 and 4 of another child show the same general characteristics, but at a little later age, the first permanent molars being in place.

Please keep these two sets of illustrations in your mind's eye, and remember that at four years of age these teeth were in approximal contact, and that the arc of the circle was much smaller; and also, that these spacings in a more or less degree will occur in all normally developing arches.

It is now desired to show cases that are deviations from this normal, some slight and some showing considerable lack of development. Bear in mind that

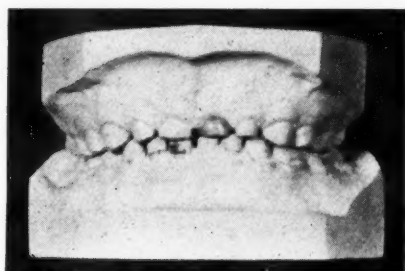


Fig. 3.



Fig. 4.

types of malocclusion existing in the adult also exist through this lack of development in the child of six or seven years of age; and in addition, such deviations from the normal as may be produced by thumb or tongue sucking, or similar childish habits.

Figs. 5 and 6 show a case that simply requires watching. The spacing and overbite are good. There is the very slightest deficiency in the mandibular incisor region.

At this point, I would like to call your attention to the fact discovered by Dr. Stanton in his usual painstaking and thorough manner. It is this: the distance measured from the mesial of the deciduous mandibular canine to the distal of the second deciduous molar is approximately the space that will be required for the mandibular permanent incisors.

Figs. 7 and 8 show a case that needs orthodontic help. Both maxillary and mandibular arches need stimulation for growth. Do not be misled by the

thought that the eruption of the permanent teeth will cause this stimulation or widening; for while the permanent molars will erupt on the arc of a larger circle, they will have no effect on the previously formed deciduous arch.

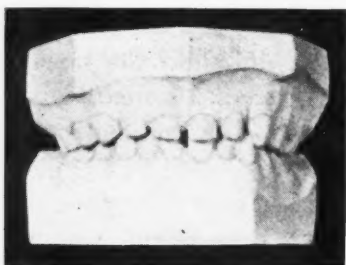


Fig. 5.

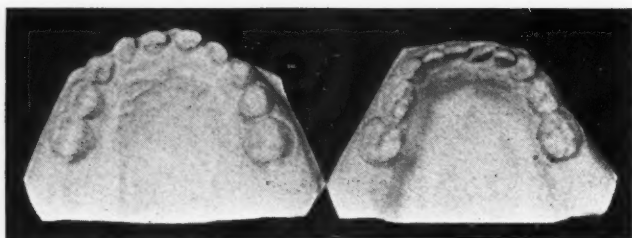


Fig. 6.

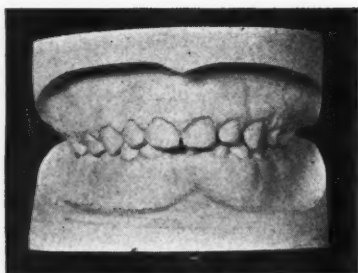


Fig. 7.

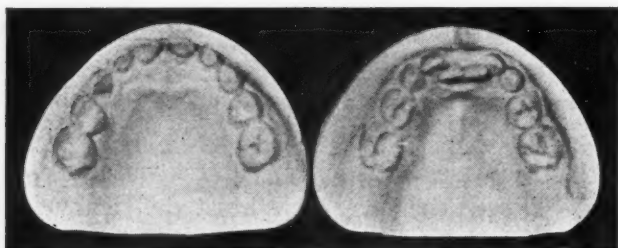


Fig. 8.

Figs. 9 and 10 of another child show the same conditions, but more pronounced, and at a later age. Note the position of the erupting mandibular left lateral; also space for maxillary left lateral.

Figs. 11 and 12 show a case of deep overbite. These cases are the greatest stumblingblock for those having children under their professional care, for

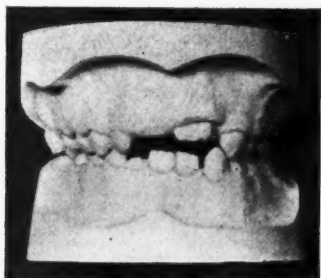


Fig. 9.



Fig. 10.

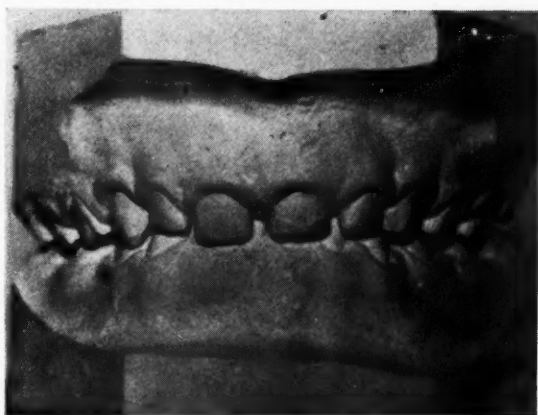


Fig. 11.



Fig. 12.

the arches are symmetrical, the overbite not particularly unpleasant in appearance; and until the eruption of one or two permanent incisors, the condition is overlooked.

Fig. 13 shows a case with the maxillary incisors lingual to the mandibular incisors. These cases, fortunately, are easily and easily recognized, and are, in my opinion, the easiest of the deciduous cases to treat, and are self-retaining.

Figs. 14 and 15 show a case of anterior occlusion; narrow arch, high vault and lack of development. Please compare this in your mind with the normally developing arches first shown.



Fig. 13.

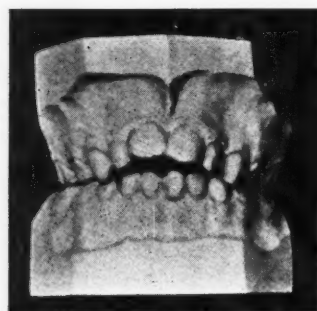


Fig. 14.



Fig. 15.

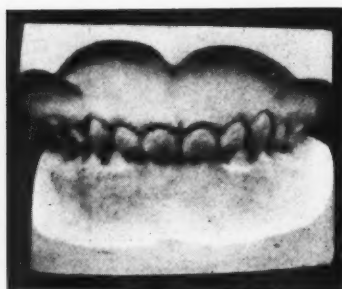


Fig. 16.



Fig. 17.

Figs. 16 and 17 show a case requiring just a little help.

Figs. 18 and 19 show the same case, one and a half years later.

I should now like to show a few cases that have received orthodontic help, and to mention (as no doubt you have already noticed) that all the cases demonstrated had normal mesiodistal relationship.

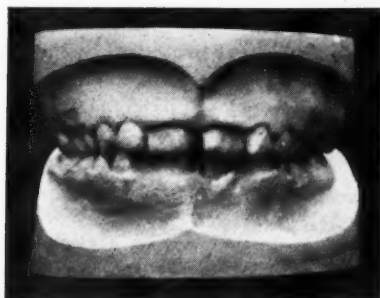


Fig. 18.



Fig. 19.

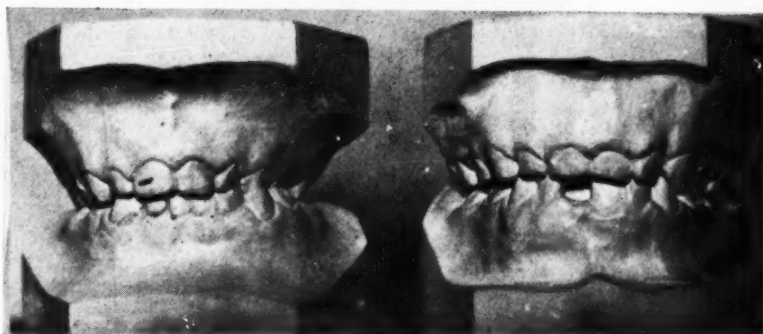


Fig. 20.

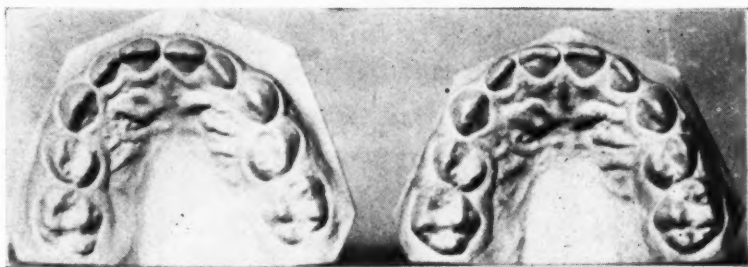


Fig. 21.

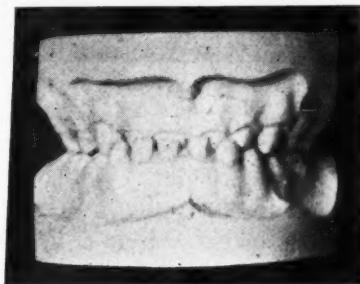


Fig. 22.

Fig. 20 demonstrates a case in which one side of the maxilla is in lingual occlusion. The same case after orthodontic assistance is shown. Note the development as a whole.

Fig. 21 shows an asymmetrical arch before and after receiving help.

Figs. 22 and 23 show the maxillary incisors lingual to the mandibular, and the effect on the mandibular incisors and canines.



Fig. 23.

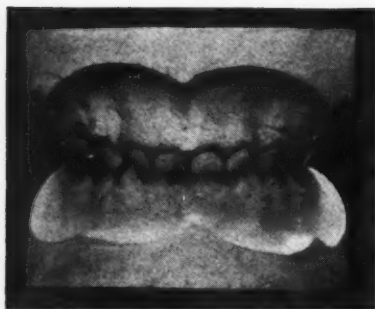


Fig. 24.



Fig. 25.



Fig. 26.

Fig. 24 shows the same case after orthodontic assistance.

Figs. 25 and 26 show a case before and after stimulation for growth.

In conclusion, I should like to say that knowing these conditions to exist, and that they are caused by lack of growth or development, of which the teeth are but a phase, shall we not seize the opportunity when it presents itself, to do good to these little ones whom it is our joy and privilege to serve?

SOME OBSERVATIONS ON THE RELATION BETWEEN THE DENTAL SPECIALIST AND THE GENERAL PRACTITIONER*

BY THOMAS P. HINMAN, D.D.S., ATLANTA, GEORGIA

"O, wad some Power the giftie gie us
To see oursels as ithers see us!
It wad frae mony a blunder free us
An' foolish notion."

IT SEEMS to me that this well-known quotation from Bobby Burns is particularly applicable to the subject under consideration this evening. What blunders, what foolish notions, might be avoided if, through the eyes of the general practitioner, the specialist could view himself; or, on the other hand, if the general practitioner could always consider his ways from the viewpoint of the specialist. Both might be made wiser, if not better, men.

As we are all aware, this is a day of specialization. And, of necessity, there has appeared in the last two decades the specialist in dentistry. That there is a real need for these specialists has been so clearly demonstrated that no brief is needed for anyone to argue this patent fact. However, the relation between the specialist and the general practitioner, and vice versa, has not been as clearly defined as would seem desirable. I have searched the Dental Index, beginning with 1839 and ending with 1920, and find no paper which deals exclusively with this subject.

Perhaps the relation is one of antithesis. Some one has aptly said (I think it was one of the Mayos) that a specialist is a person who "knows more and more about less and less." In pondering this statement, I have wondered if, on the contrary, a general practitioner might not be classed as a person who knows *less* and *less* about *more* and *more*.

The tendency, in every walk of life that is highly specialized, is toward narrowness of vision and unless a person has a broad view of his own department of his profession and also a good working knowledge of the allied branches, he soon becomes so absorbed in his particular phase of the work that all other phases are minimized in his mind. This narrowness of vision necessarily reduces his real value to his work. What I shall have to say in this paper, although particularly bearing on the departments of orthodontia, will, nevertheless, be applicable in part to other specialisms in dentistry.

I know of no department in dentistry that has a greater bearing on oral and general health than has orthodontia, and possibly a smaller percentage of men practicing dentistry have a clear knowledge of the etiology of this phase of our work. My observation is that there are a great many men who attempt to straighten teeth, but there are very few real orthodontists. In

*Read before the New York Society of Orthodontists, December 14, 1927.

this paper, I propose first to speak to the orthodontist and then to the general practitioner.

In the nature of things, a great many patients are referred to the orthodontist by the general practitioner. In many instances, the mouths of children who are referred are in no condition to receive orthodontic treatment, evidences of decay and diseases of the soft tissues being frequently present. Now, it is certainly the duty of the general practitioner to put these mouths in a clean, healthy condition before the patient is referred. On the other hand, it is just as much the duty of the orthodontist to defer his work until this phase of the situation has been accomplished.

During the treatment of every case of orthodontia, the detachable part of the appliance should be removed at regular intervals and prophylaxis instituted. At the same time, critical examination of the mouth should be made for evidences of decay or irritation of the soft tissues, and should there be need for it, immediate relief should be given. It is in this particular phase of the work that so many orthodontists fail. Many young patients are referred to the orthodontist with the mouth in good condition and are returned with defects that would seem almost deplorable. No prophylactic treatment has been given, nor has examination of the teeth for caries been instituted for a considerable length of time and the result is that irritation of the tissues around the cemented bands is evidenced by a chronic inflammation of this tissue. In numerous instances, cavities have begun between the band and the adjoining tooth and the mouth is found in a generally lowered condition of vitality. It is evident that with appliances in the mouth, the patients themselves cannot maintain cleanliness, therefore, it is the duty of the orthodontist to see that this condition is looked after. I have seen cases returned from the orthodontist where little or no attention had been paid to the mouth conditions other than the irregularity and in such a pitiable plight that I question—although the irregularity had been corrected—if the mouth was not in such a state that it would probably have been better had nothing been done from the standpoint of correcting this defect.

I believe, in the office of every busy practitioner of orthodontia, there should be a skilled prophylactician who cannot only clean the teeth properly, but also can make an examination of the mouth for cavities. When these appear, the patient should be sent to the referring dentist for proper treatment. Also, it is a sad commentary on dentistry for the orthodontist to allow the hard tissues of the mouth to be destroyed and the soft tissues to be damaged by his manipulation of the orthodontic appliance. Such a one fails entirely to recognize the true condition of the oral tissues. It is high time that the orthodontist should give his attention to this condition and take steps for its prevention.

In referring a patient, the general practitioner and orthodontist should have a clear understanding of each man's relation to the case. It should be thoroughly understood that the patient will be referred back to the general practitioner for the necessary dental treatment, and if the orthodontist does not maintain a prophylactician, the referring dentist should have general supervision and control of this work also. If this is done, contact with the

referring dentist will be constant and a more thorough understanding of the ends and aims of the orthodontist will exist. The orthodontist should not feel that his fellow practitioner is entirely ignorant of the orthodontic work; nor should he feel that the referred patient is entirely his case. In other words, the general practitioner should be interested in what the orthodontist is doing, and when this is the case, the orthodontist should undoubtedly recognize and appreciate the fact. The orthodontist who fails to keep his mind in touch with the general development in dentistry, and can only see his phase of the profession, minimizes his value to his patients and reduces his ability to comprehend the many factors which must be considered in the treatment of orthodontic cases.

It is a self-evident fact that the specialist should keep his mind broadened by attending general meetings so that he may attain familiarity with the advances made in general dentistry. The general practitioner, on his side, should also attend meetings of the specialist and keep in touch with their advancement. The relation between the two should be that of correlation, not isolation. The specialism of orthodontia can never be entirely separated from dentistry; if it is, it will lose its power for good and its ability to properly care for the many demands made upon it. There is a tendency on the part of the specialist to live apart. This is one of the greatest mistakes he can possibly make. There is no place for an aristocracy in any department of dentistry.

Orthodontia is such a deep study and is such a highly specialized branch of our work, it is my belief that the general practitioner, with his knowledge, which certainly is general and not specialized, should not undertake the treatment of orthodontic cases. It has been my observation that more damage than good has been done by men in active, general dental practice undertaking these cases.

In some sections of the country, there has been a tendency on the part of the general practitioner to receive a portion of the fee paid by the patient to the specialist. I know of no more reprehensible practice. I, personally, consider it a form of petty thievery in which the patient is the victim. Whatever work the specialist does, he should be paid for it and there can be no excuse whatever for the referring dentist's receiving any portion of the fee that is paid the specialist. Place yourself in the position of the patient. How would you feel if you knew such a practice was being perpetrated on you? It is strictly against the Code of Ethics of the American Dental Association and is a form of petty graft that stultifies both parties involved.

There is another form of practice among orthodontists in some sections. that is, after a patient has had appliances in the mouth for a considerable length of time and the parents become dissatisfied with the treatment they are receiving and then consult some other practitioner. In some sections, the practice of accepting these patients, removing the appliances and instituting treatment without consulting the dentist previously employed, has been in vogue. It is difficult to find words sufficiently condemnatory of this practice. It is certainly a violation of the Golden Rule and is a form of practice that should be vigorously condemned. When cases occur of this character, the

first thing that should be done is to see that the dentist who has had the case under treatment has no bills against the patient that are unpaid; second, a clear understanding with this man that you are accepting the case with his knowledge and approval. He certainly could not object to some one else taking the case if his patient is dissatisfied, and I am sure this would bring about a much closer relation between orthodontists.

So much investigation and real scientific research in this department of our work have been accomplished in the last decade, it requires a great deal of the time of the orthodontist to keep up with his phase of dentistry, and the general practitioner, if he is active and controls a large practice, certainly has not time to give this work the thought and skill which it requires.

Bad mouth conditions during orthodontic treatment are frequently due to the minimized ability of the patient to masticate his food, and the orthodontist, in consultation with the pediatrician, should see that the nutritive phase is not neglected. He, himself, should have a knowledge of nutrition, so that by careful inquiry, he may be able to determine whether the case under treatment is receiving proper food values. He should also have a working knowledge of bodily growth. As orthodontia is a stimulant to the developmental processes in the mouth. We cannot expect results unless the nutritional side, which must be the basis of normal development, is considered as a phase of treatment. Failure has been frequent because of a lack of knowledge of the relation of nutrition to bodily health.

In the discussion of a paper by Dr. Thaddeus P. Hyatt of Brooklyn, N. Y., on the subject, "How Can Orthodontics Help Preventive Dentistry?" Dr. Frank A. Delabarre makes the following remarks: "Every orthodontist knows of the great need for more adequate attention to children's teeth in order to prevent the loss of the deciduous teeth, which is so often a serious complicating cause of malocclusion. * * * Our whole field of endeavor becomes an illogical gesture the moment the physical condition of the mouth is neglected." He further says: "We should enter the fight for children's dentistry and exert all our influence to force the adoption of its practice on the profession principally for the tremendous health influence it will have on the child and incidentally as an aid to our own work."

To these remarks I might add this suggestion, that the committee on publicity of this society immediately take active steps to disseminate information to the practitioner of dentistry, this information to show the need of early intervention in orthodontic treatment, and the immense value of the deciduous teeth to the permanent denture. This point has not been sufficiently stressed. Then, if the general practitioner is not enough interested in these truths to put them into practice, I think general information should be properly disseminated through the secular press, so that the mothers of this country can have at their command a clear enough knowledge of the situation to seek the advice and service of those who are sufficiently interested in this work to perform a service so valuable to the children.

I am glad to note the resolutions adopted by the Society of Orthodontists in Atlanta, Georgia, April 4, 1925, and reiterated more fully at a meeting of the same society in Chicago, May 4, 1927. Yet, while it is all very well to

pass resolutions, unless the parents themselves are sufficiently informed to see that this work is accomplished, and the orthodontist has initiative enough to call attention to defective mouth conditions and specifically request the referring practitioner to put the mouth in a healthy condition, the ends so greatly desired will not be realized.

"The welfare of the patient first" should be the slogan of every practitioner of dentistry. To this end, the hearty cooperation of the orthodontist and the general practitioner is essential. May we not have a clearer understanding and a greater unity of interest between the specialist and other members of the profession? This can only be accomplished by a complete recognition of the ideas and ideals of all parties concerned. In service there is no contention. If we respond to the needs of the world with all the talent we have and seek to serve humanity, we shall realize our ideals more surely, and shall find ourselves more quickly through the acceptance of the dictum, "Service to Our Brother Man," in its best and broadest sense.

DISCUSSION

Dr. William Dwight Tracy.—I am much complimented by your invitation to be present with you today and to have a small share in your deliberation.

The paper just presented by your guest, Dr. Thomas P. Hinman, I regard as an important contribution to dental literature and is full of sound logic and good advice. In fact his statements are so obviously true that I find but little if any opportunity to differ with him.

Those of us who have been in practice twenty-five years or more have observed with growing interest the development of various specialties in dentistry, and it is interesting to note that thirty-five years ago the dentist who could not successfully meet the requirements in all departments of his work was regarded as incompetent, whereas the dentist of today, located in a large city, who undertakes to practice all branches of dentistry is looked upon askance.

The march of progress has been so rapid, and the white light of science has been so strongly focused upon the various phases of dental practice, that it would be a brave man indeed who would dare to pose as being expert in all branches of dentistry as matters stand today.

Many of us used to practice exodontia, orthodontia, periodontia, full denture prosthesis, oral surgery and other branches of dental service which are now regarded as specialties.

As these branches of the work have become more highly specialized, however, and as the scientific knowledge pertaining to these various types of special endeavor has accumulated so rapidly, many of us who are involved with the responsibility of conducting a large general practice have found it absolutely necessary either to take into our professional group men who are qualified as specialists or else, in the best interests of our patients, to refer them to men specially qualified to render the highest type of service in certain specialized fields of work.

In other words, and speaking of my personal experience, I have found it impossible to meet the demands of general practice and to keep abreast of the progress made in orthodontia, periodontia, oral surgery and prosthodontia. I used to do the work that comes under these special headings, but long ago realized that it was impossible for me to keep up with them and did not have to be told that my patients were entitled to the best that our city had to offer, and in justice to them it became necessary for me to refer them to others who by study, postgraduate work and devotion to a high ideal in their specialty were naturally better fitted to minister to their needs than I could possibly be.

I have observed that with rare exceptions the men who become most skilled in the specialties and who are most dependable are the men who have a background of general practice and are therefore well trained in the broader aspects of dentistry, and I have always

felt that the best interests of all would be best served if those who are responsible for the upbuilding and development of the specialties would plan to keep in close touch with the mother profession.

I am in entire accord therefore with Dr. Hinman when he expresses the opinion that it is wise for the general practitioner to keep himself posted on the progress being made in the specialized fields of dentistry, and necessary also in a general way for the specialist to be familiar with the trend of events in general practice.

To speak more definitely of orthodontia and its exponents I am glad to say that in my opinion they enjoy the admiration and respect of the entire profession. Orthodontia as a specialty has perhaps grown more rapidly and gone farther in its accumulation of knowledge than any of our other specialties, though substantial progress has been made by all. Orthodontia, however, is confronted by many problems still to be solved. The friendly and interested cooperation between the general practitioner and the orthodontist as recommended by your essayist is absolutely essential if the patient's welfare is to be safe-guarded.

My own relations with orthodontists have always included this kind of cooperation, but I have heard criticisms made of men practicing in this field because of their lack of interest and attention to the welfare of the individual teeth in the mouths of patients under their care. In the interest of the good reputation of orthodontia as a specialty the cause for this sort of adverse criticism should be eliminated.

The picture which Dr. Hinman paints of the child who has not had careful oversight by both orthodontist and general practitioner during the progress of the treatment of the case is indeed an unpleasant one and should stimulate both the dentist who referred the case and the orthodontist who treats it to use every precaution to prevent injury to the teeth or soft tissues.

Dr. Hinman mentions the degrading and low lived practice of fee splitting among some general practitioners and some orthodontists. This is a serious blot on the escutcheon of dentistry, and it is well known that this ulterior practice is giving a good deal of concern also to medicine.

We must of course have our code of ethics, but the publication of a code together with the penalties for the infraction thereof will not make men love justice or respect the rights of others any more than a Volstead Act will create a nation of teetotalers. I do not know how it is in other states, but in the state of New York any practitioner of dentistry who is reported to the authorities as giving or receiving a split fee and who after a hearing is convicted, will suffer the revocation of his license.

It therefore behooves all of us to be on the watch for abuses of this sort, and when definite information is available take such steps as may be necessary to convict the culprit. A few licenses revoked, it seems to me, would have a salutary influence upon others who might be tempted to utilize this nefarious method of gaining practice.

If there is any time or circumstance when the principles of preventive dentistry should be carried out to the letter it is during that trying period when a child or youthful patient is wearing orthodontic appliances and this can only be carried out when there is complete and understanding cooperation between the referring dentist and the orthodontist.

While physiologic laws more or less definitely regulate the time factor in the completion of a case under orthodontic treatment, any device or method of treatment which will reduce the length of time consumed will be looked upon as a distinct advance by the general practitioner. Any improvement or modification of appliances which tends to simplify them and make them less threatening or inimical to the integrity of tooth structure must also be regarded favorably.

Complications in general practice or in the specialties continually arise which make it very difficult for the practitioner to protect the patient's former dentist, but if we bear always in mind Dr. Hinman's slogan, "The Welfare of the Patient First," we should not go far astray.

Dr. J. Lowe Young.—I have had the pleasure of reading Dr. Hinman's paper and there is really very little with which I can take exception. He might have gone a little stronger on some points, I think, but you know he is a very modest man and he did not want to be too hard on the specialist.

I have always felt that the dentist who refers a patient to a specialist, should not pass the case over and lose interest in it. I think that is a very grave mistake. If the patient is under the care of a dentist and is referred to a specialist, the parents of the child naturally feel that he still should have an interest in the case, and I think he should.

Dr. Hinman brought out the point of the condition of the mouths of the patients when they are referred to the orthodontist. I have found in the past that it was not infrequent that patients were referred to me with a number of cavities in the teeth. I have always taken the stand that I would not put appliances on until the teeth were put in a safe condition. Some of the younger men may feel that to do this is a reflection on the ability of the dentist who referred the case but if you will take the time to go and talk to the dentist about it you will find that you won't have any trouble.

He also brought out the point of the care of the tissues during orthodontic treatment. Every one knows that it is impossible to put any type of orthodontic appliance in the mouth without it rendering the teeth and the investing tissues more difficult to keep clean. Therefore, it is the duty of every orthodontist to take particular pains to look after the condition of the teeth and their investing tissues during the time they are under his treatment.

Dr. Hinman further brings out the point that if the orthodontist has not an oral hygienist connected with his staff, he should refer his patients to some one who has. I believe this should be done and along with this the orthodontist should give thorough instruction to the child in home prophylaxis with the proper use of the tooth brush. We have the children during their formative period, and frequently I say to the mother that if I do not do anything else than teach the child how to thoroughly care for the mouth, whether I correct the malocclusion or not, I have done a wonderful service to the child. I believe statistics will show that 95 per cent of the inception of dental decay occurs before adult life. Now, if we can get them through that period without any decay at all, they won't have very much need of the dentist after that.

For a number of years I have been trying to instruct every patient who comes into my office in the use of the tooth brush as Dr. Stillman brought out in an article—in the *Dental Cosmos* of October, 1924. It is simply a massage of the gums with the tooth brush.

In the opinion of the essayist several years of general practice are essential before one should specialize in any branch of dentistry. I agree with that on general principles but this is not always feasible, and I am convinced that if the man is of the right type and does not feel when he gets his dental degree that he knows it all but is willing to go on and learn and improve himself by attending Dental Society meetings and reading dental literature, he can become a safe man without those years of general practice. I am not at all opposed to the man having the years of general practice but they cannot all have it.

In Dr. Hinman's reference to an orthodontist removing appliances put on by another orthodontist I did not understand him to include the removing of appliances put on by a dentist. I have always maintained that where a patient has been under treatment by an orthodontist or a dentist, if that patient comes to me for consultation, while still wearing the appliances put on by either of the aforesaid, I refuse to have anything to do with the case, other than as a consultant, without the written consent of the one having the case under treatment. I think that it is only fair that we should consult with the one who has put those appliances on, and by doing so we find out a lot about that patient—whether he is conscientious in fulfilling his obligations; whether he keeps appointments, and so forth. So I have been pretty set on that phase of practice and I believe that it is a good way to educate people not to go shopping around. I have made it a practice for years never to consider the word of a patient against that of a professional man. I do not care how carefully you may talk to a patient or to the parent of a patient, if he goes to some one else and conscientiously tries to tell him what you said, he is likely to mislead the other fellow, and I think we have to be very careful about that.

WHEN SHOULD TREATMENT BE BEGUN?*

BY HARRY E. KELSEY, D.D.S., F.A.C.D., BALTIMORE, MARYLAND

THE title of this contribution to the symposium, is in the form of a question, which has been asked probably as often as any other concerning orthodontia, and the answers to it have reflected the wide diversity of opinion which has existed on this subject, since long before the specialty of orthodontia came into existence. However, the gradual tendency has always been to reduce it statistically to a definite age. Dentists and orthodontists, too, seemed to feel that every case of a given age, that responded successfully to treatment, was a strong argument that that particular age was the best to begin treatment for all patients. Especially did this seem impressive when it was supported by similar results in a number of other cases.

This of course created a nucleus of opinion associated with various ages, and around such nuclei groups formed, some of course faster than others, and the larger groups finally submerged or absorbed the smaller ones. Eventually the great mass of the profession accepted the theory that the right time to treat malocclusions was always after the loss of all the temporary teeth and the eruption of all the permanent ones, except the third molars; and this pernicious theory has unfortunately a vast number of exponents today, who are still basing their advice upon a traditional fallacy. But there persisted always two other small groups of dissenters, one of which advocated very early treatment and the other, treatment at such time as conditions in the individual case seemed to warrant. These two last groups were formed by men who, deserting the traditional beliefs regarding malocclusions, carried on their practice and study, not only with a view to benefitting the patient in hand, but also others, by applying the knowledge thus gained, to their treatment.

Notwithstanding the fact that the literature occasionally showed notable contributions to the subject, characterized by real observation, study, and thought, the real renaissance in orthodontia did not begin until about 1900, its greatest impulse being through its establishment as a specialty of dentistry. Men who applied themselves to the new specialty felt the necessity of justifying their positions, both by the results of their treatments and by supporting their views in professional journals. This was natural, but many of them besides had at heart a desire for the truth, and gradually true research was undertaken by men glad to offer for discussion their own opinions based on the results of their efforts, and with a well-formed purpose not to accept blindly without investigation the traditional views which might be held by others. Such investigation as this has brought us farther along the road in a shorter time than all that went before it.

In the old days there was neither classification of malocclusions nor of treatment, and it was generally held that each case was a law unto itself, and

*Read before the New York Society of Orthodontists, New York City, Dec. 14, 1927.

that an appliance must be invented to treat it, but this was not held to be true with regard to the time of treatment. My feeling is, that we have reversed conditions today, and instead of attacking each case from an individual standpoint, so far as the treatment and appliances used are concerned, we now attempt to classify and diagnose the condition and then for the most part, the treatment and the appliances to accomplish the desired result readily suggest themselves, and we do therefore now regard each case as a law unto itself, so far as the time of treatment is concerned. In other words, we are concerned with etiology and with the individual possibilities of cases, and we believe that could we determine the precise individual developmental possibilities of a given case, and the best age at which it should be treated, the appliances are at hand, and a knowledge of their use is available to accomplish our end.

The first three papers of this symposium go far toward answering the question asked in the fourth, and I regret that I did not have the opportunity of comparing notes before this meeting. The preceding papers make it very clear that a proper understanding and appreciation of the nature of malocclusions, together with such knowledge of the physiologic growth and developmental possibilities inherent in the individual case, is the goal toward which we have set our faces, and that some progress has been made along this road. This matter is being very diligently studied in Europe and a number of men have recently reported more or less complicated methods of diagnosis. It is generally conceded that we can bring about changes in the position of the teeth. Dr. Eby has dealt with this subject in his explanation of, "Why teeth can be safely moved."

As before intimated, observation of cases from infancy to maturity provides the best and most intelligent basis of determination as to the proper time to begin treatment in a given case and increases our fund of general knowledge of the subject. Such knowledge we will necessarily have to draw upon in cases where neither we, nor the patient, can have the advantage of continuous observation from early childhood.

And now to be more explicit, I will take up the subject of my discussion as it appears in the title. Basing my argument on the foregoing, the time to begin treatment is when, through observation and experience, one has arrived at the honest conviction that the case in question is developing along abnormal lines; that there is in other words, a deviation from normal, at least in some respect, and that this is growing worse, and is of such a nature, that there is no possibility of the patient overcoming it during one of the active growth periods which occur in the lives of children.

Now it has been well demonstrated that defective fissures in the teeth should be filled; in other words that incipient caries should be treated. The profession has indorsed this view, both the general practitioner and orthodontist. Resolutions have been passed on the subject. It embodies the idea of correcting a defect as soon as it makes its appearance. We go farther and enjoin such strict preventive measures as are involved in the filling of enamel fissures, which have not, but will otherwise, become a site of decay. All this argues early interference and if it be a wise procedure for an individual tooth, then by analogy it

would seem to be proved that orthodontic treatment for malocclusions of the teeth should be started in its incipency, or even when, though the denture at the time is functionally perfect, it is nevertheless apparent that development of the supporting structures of the teeth is not keeping pace with the space requirements of the permanent set.

Much has been written in support of this view by many experienced men, and by other experienced men it has been vigorously opposed; their argument being based not so much on theoretical grounds, as on the results of practice. It does seem logical to assume that there may be a difference in treatment, which the tooth, a finished product, should receive, and the denture as a whole an unfinished and still developing organ, should receive. If I may be permitted to speak of my own procedure, I would say, that it is my custom, as far as possible to put a case under observation for a time before beginning treatment. I advise people with whom I come in contact, those whose children are patients of mine, when they ask me about younger children, to bring them for observation at intervals of six months to a year, until it can be determined whether treatment will or will not be required. When a decision has been reached that treatment will be necessary, it is begun with the idea of treating the condition which presents at the time and bringing the denture with its associated structures back to normal. The treatment is then discontinued with the understanding that a further period of treatment may be needed at a later time and that the patient is to come in for occasional observation. In this way, we avoid having the child spend practically all of its early life with appliances in the mouth, as was done so often when the case was started at seven or eight years of age, with the idea of continuing until all of the teeth, except the wisdom teeth, were erupted and in as good occlusion as it was supposed possible to put them.

The following cases may serve in a measure to illustrate the ideas which I have tried to bring out in the foregoing:

Patient about six years old, presented an excellent deciduous dentition with sufficient evidences of growth to indicate nature's effort to provide room for the permanent teeth. There was, however, a slight tendency toward a posterior occlusion, but the relation of maxillary and mandibular canine teeth seemed to indicate that the actual relation of the jaws was normal. The case was kept under observation for about a year, when it became evident that nature was not providing as much space as the permanent teeth required, especially those comprising the anterior segment of the arch. Treatment was accordingly begun to enlarge the arches.

Another patient at the age of seven years, who, while functionally perfect was nevertheless failing to develop adequately; the two mandibular permanent central incisors were occupying the space of the deciduous centrals and right lateral. Results in both cases seemed to justify decision to treat them.

Another patient four and one-half years old, in whom the mandibular arch was well developed; the maxillary arch was well developed on left side, but on right side it was constricted, and the teeth were in lingual occlusion. It was evident that this condition should be treated as soon as possible, because no alteration in the buccolingual relations on the right side could possibly take

place as long as the deciduous teeth remained in the mouth, and it was most unlikely then, that the permanent teeth could assume normal relations, and if they did, that side of the maxillary arch would be undeveloped. In some patients treatment can be started at four years or earlier, while others cannot be handled at that age. It is hoped that appliances can be put on this case in the spring.

Patient about six years old. This patient was apparently developing perfectly, and was normal for his age. The right mandibular central had erupted in lingual position and left one would soon do so. Removal of both deciduous centrals was advised. Jaws were growing and space was apparently increasing to accommodate these teeth. It would be folly to put orthodontic appliances in this mouth at this time and it is quite likely that he will never need them.

Patient six years old. This was one of the most exaggerated buccolingual malocclusions I have ever encountered and I think all will agree that the sooner orthodontic interference is started in a case of this kind, the better. Six months treatment accomplished a great deal. In fact the maxillary molars were beginning to occlude on top of the mandibular, when patient was taken abroad. Before going, Hawley retainer was put on maxillary and lingual arch on mandibular, and treatment will be resumed on his return, which will be in a short time.

American Dental Assistants Association

The fourth Annual Meeting of the American Dental Assistants Association will be held in Minneapolis, Minn., August 21, 22 and 23, 1928, at the Leamington Hotel.

Ruth F. Rogers, Secretary,
Suite 1760, 16 N. Wabash Avenue,
Chicago, Ill.

American Society of Oral Surgeons and Exodontists

The tenth Annual Meeting of the American Society of Oral Surgeons and Exodontists will be held at the Radisson Hotel, Minneapolis, Minnesota, August 17 and 18, 1928.

Dr. Harry Bear, Secretary,
410 Professional Building,
Richmond, Va.

DECIDUOUS TEETH—EFFECT OF TOO EARLY LOSS AND TOO LONG RETENTION*

By C. STERLING CONOVER, D.D.S., NEW YORK CITY

CONTINUING chronologically from where Dr. Gunton left off, at approximately the age of six or seven years, and proceeding through the mixed denture period up to about the twelfth year, the subject which has been allotted to me, while almost as old as dentistry itself, is one which warrants frequent repetition because it lends itself so readily to practical application in the every-day life of both the general practitioner and the orthodontist. Conse-

PREMATURE LOSS (FIGS. 1 TO 11).

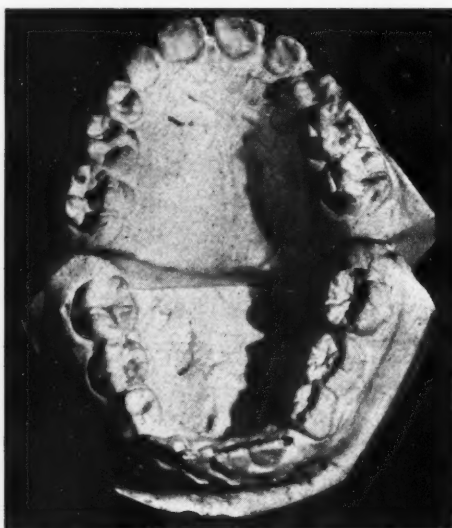


Fig. 1.—Occlusal view of a case showing the result of the premature loss of the maxillary and mandibular deciduous canines. The spaces have practically closed, leaving no room for the permanent canines to erupt into their normal positions.

quently, this paper will be more in the nature of refreshing our minds with thoughts with which we are all more or less familiar and which are generally accepted, rather than in the discussion of anything new.

Along with certain pernicious habits, the premature loss and the prolonged retention of the deciduous teeth are the most fruitful of the local causes of malocclusion. Parents should be taught to appreciate the importance of preserving the deciduous teeth up to the time each succeeding permanent tooth is to erupt. During the developmental years of youth, the maintenance of

*Read before the New York Society of Orthodontists, New York City, Dec. 14, 1927.

function in the deciduous denture should be a sacred duty with every dentist because at this period of life function and growth are synonymous. The deciduous teeth may be said to serve the following purposes:

1. To provide a means for the mastication of food for the child with teeth of such a size that can be accommodated in the small jaws and that harmonize with the small features.

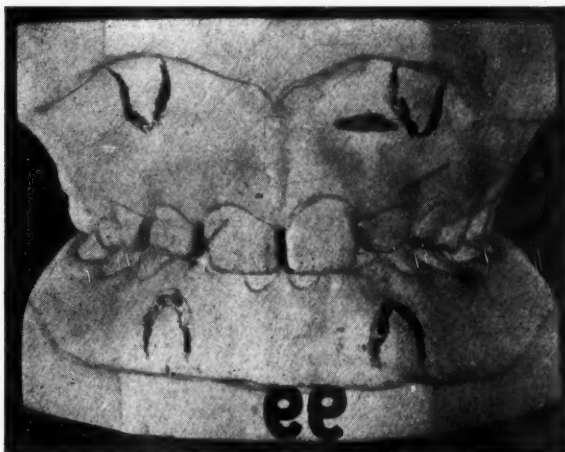


Fig. 2.—Labial view of the same case.



Fig. 3.—Occlusal view of another case showing result of the premature loss of maxillary right second deciduous molar, maxillary left canine and the mandibular left canine and first deciduous molar.

2. To give Nature the opportunity to develop and erupt the permanent teeth at regular intervals as they are needed in the general plan of growth and function.

3. To provide the stimulus through masticatory function, to help develop the dental arches and the contiguous structures of the internal and external face.

4. To exert the proper influences to establish the correct relationship of the permanent teeth.

Between the fifth and sixth year the first permanent molar starts to erupt distal to the second deciduous molar and unless the deciduous teeth are all in position and of the normal mesiodistal width or the proper space maintained for those prematurely lost, one or more of the permanent molars may tend to

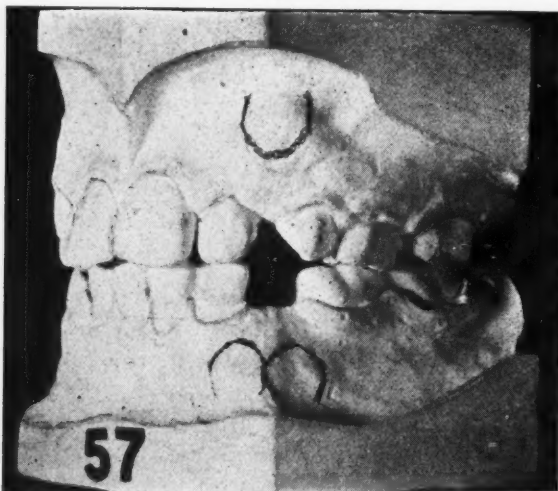


Fig. 4.—Left buccal and labial view of same case. Note maxillary left canine space practically closed and insufficient room in the mandibular arch for the eruption of the left canine and first premolar.

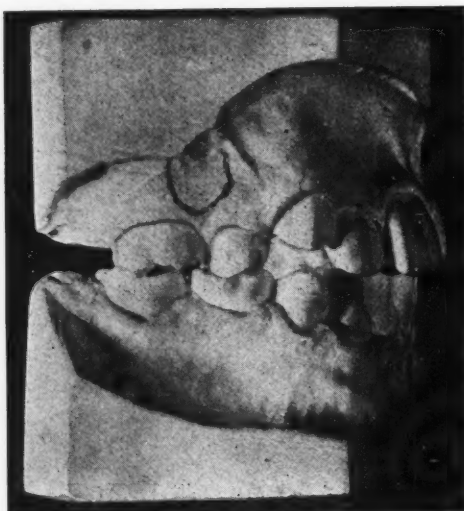


Fig. 5.—Right buccal view of same case. Note how the maxillary first molar has drifted forward and entirely closed the space into which the second premolar should erupt.

drift forward. This drifting may destroy the normal relationship of these teeth and disturb the future occlusion of the permanent arches, as the relative positions of the adjoining permanent teeth are largely dependent upon the positions assumed by the first permanent molars. When a deciduous tooth has been prematurely lost, the proper space should be maintained by a space retainer, which may be either of the fixed, removable or stress breaking type.

The space maintained should be the mesiodistal width of the lost deciduous tooth. Proximal fillings in deciduous teeth should restore the normal contour and mesiodistal width of the teeth and consequently should be made of amal-

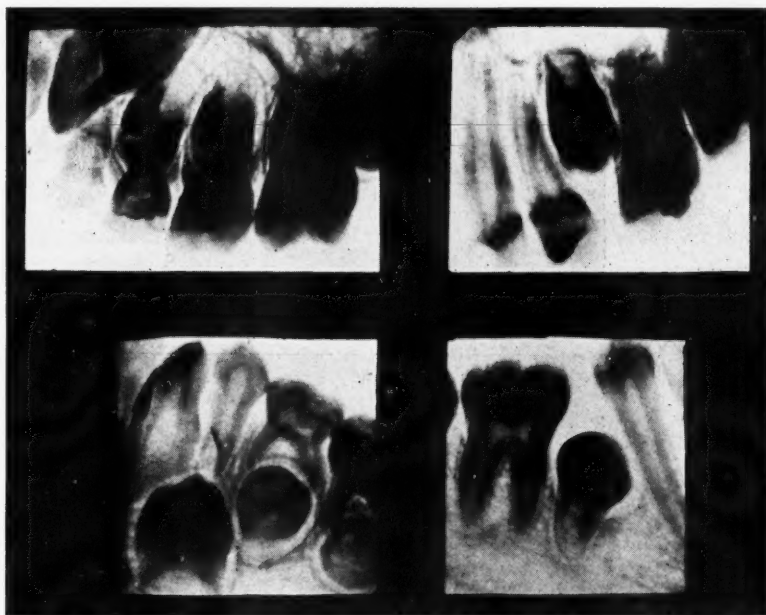


Fig. 6.—The upper and lower left sides of the figure show the deciduous molars in position and the premolars erupting normally.

The upper and lower right sides of the figure show the premature loss of the second deciduous molars and insufficient space for eruption of the second premolars.



Fig. 7.—X-ray view of a case showing sufficient space for the erupting right second incisor and insufficient space for the erupting left second incisor.

gam, copper amalgam, gold or some material of a more permanent nature than ordinary cement.

In addition to the foregoing, I might mention a few practical reasons which stress the importance of careful attention to the deciduous teeth. A tooth in which caries has progressed to the point where it becomes sore to

The following four slides (Figs. 8, 9, 10 and 11) show several different types of space retainers but the retainers are not intended to be particularly indicated for the cases upon which they are mounted.

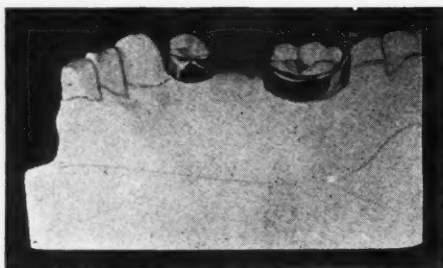


Fig. 8.—Showing simple soldered space retainer.

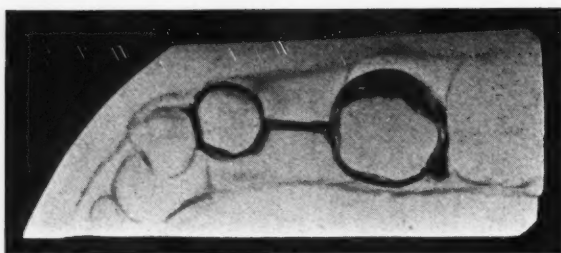


Fig. 9.—Occlusal view of same space retainer.

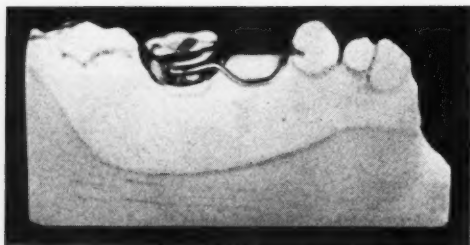


Fig. 10.—Showing space retainer for lost first deciduous molar with a band on the second deciduous molar and wire extension forward to the distal of the canine.



Fig. 11.—Occlusal view of a case showing on the right side of the arch a removable space retainer and on the left side a fixed retainer of one band and two extensions retaining two spaces.

PROLONGED RETENTION (SEE FIGS. 12 TO 18).



Fig. 12.—Occlusal view of a case, showing prolonged retention of the maxillary left second deciduous molar. Note premature loss of mandibular right first permanent molar and drifting forward of the second molar.

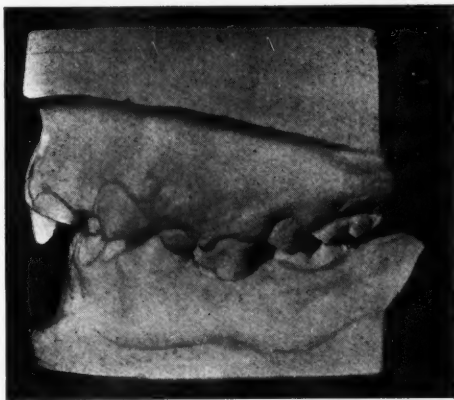


Fig. 13.—Left buccal view of same case. Note frightful state of malocclusion caused by presence of the deciduous molar.

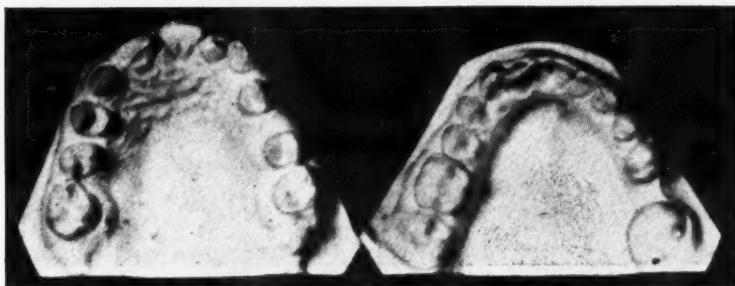


Fig. 14.—Occlusal view of same case six months after removal of the deciduous molar. No orthodontic treatment as yet has been attempted in this case.

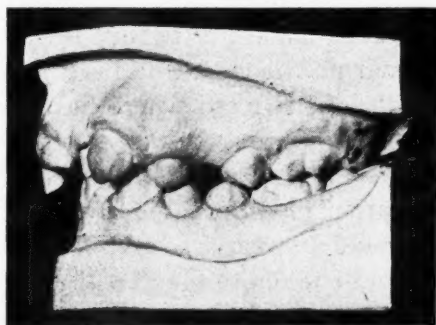


Fig. 15.—Left buccal view, note generally improved conditions.

N. B. The three following radiographic illustrations were procured from the records of the orthodontic department of Columbia University Dental School.

chew on, will naturally be avoided and the process of mastication shifted to the opposite side of the mouth, with the consequent loss of developmental stimulation on the injured side and the formation of abnormal muscular and masticatory habits. When a neglected cavity is present in both sides of the mouth, as often happens, the child does not thoroughly masticate on either side and thus bolts the food. The bad effects of this are not only confined to the immediate improper comminution of food and its accompanying disturbances, but to the possible formation of indifferent habits of chewing which may extend on through life.

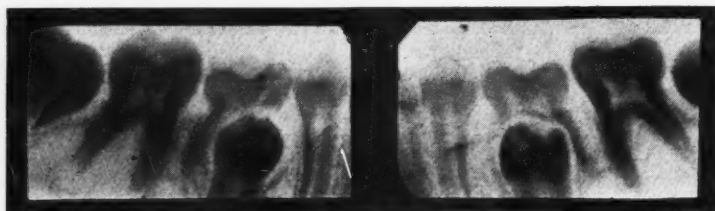


Fig. 16.—Left and right of slide. Note prolonged retention of second deciduous molars. These should be extracted to allow the premolars to erupt.



Fig. 17.—Showing prolonged retention of second deciduous molar.

Prolonged retention of deciduous teeth, especially molars, will exert a pronounced tendency to cause malocclusion by not allowing the permanent teeth to assume their normal positions and occlusal relations. It is necessary in some cases to extract deciduous teeth which have been retained too long, due possibly to wedging of the approximating teeth, slow root resorption, etc. The x-ray is a better diagnostic factor in these cases than the age, due to the marked variability of eruption in different individuals. When extraction is indicated, extreme care should be exercised not to injure its successor of the permanent set. Care should be taken to see that they are removed completely, because occasionally a small piece of a deciduous root will exert sufficient interference to cause a deflection in the eruption of the permanent tooth.

In conclusion, let me stress:

First, the importance in every-day practice of maintaining the health and function of the deciduous teeth by close watchfulness and intelligent care.

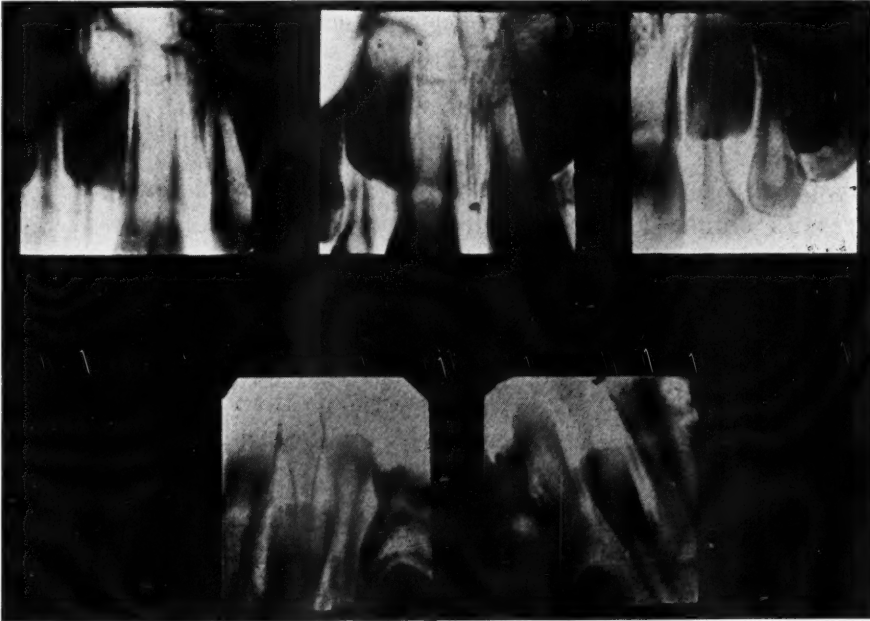


Fig. 18.—Showing unresorpted deciduous second incisor roots which are interfering with the eruption of their permanent successors.

Second, when a deciduous tooth is prematurely lost, the maintenance of the space until its permanent successor erupts.

Third, the use of the x-ray as the chief diagnostic aid in deciding whether a deciduous tooth has been retained too long.

5 EAST 57TH STREET.

THE APPLICATION OF FORCE AS A THERAPEUTIC MEASURE FOR THE CORRECTION OF MALOCCLUSIONS*

BY BERNARD L. HYAMS, D.D.S., MONTREAL, CANADA

IN THE practice of orthodontia, it may justly be stated that practically all the results obtained in the correction of malocclusions are secured by means of the application of some kind of force. This paper presents an analytic treatment of the field of the application of force. My aim is to recognize the fundamental forces that are responsible for the effectiveness of the devices which have been originated for the correction of malocclusions, to explain the biologic action of these forces so far as the knowledge of the times permits, and to examine a number of the devices employed for the correction of malocclusions in these respects. The consideration of the fundamental types of force applied by orthodontic devices provides a convenient starting point for this analytic process.

A variety of fundamental types of force may be distinguished in an examination of the common devices employed for the correction of malocclusions. By a fundamental force is meant the active force delivered by a device as distinguished from the agent for its application. These forces may be grouped into two general classes as a preliminary step to their further consideration. These classes are termed artificial forces and natural forces.

Artificial forces include those forces employed for the correction of malocclusions that are derived from foreign mechanical sources.

Natural forces include those forces employed for the correction of malocclusions that are derived from the functioning of any part of the natural denture or its associated organs.

The following fundamental types of force, each possessing characteristics that vary sufficiently to warrant its distinction as a separate force, are included in the class of artificial forces:

- The spring force of a distorted rod.

- The elastic force of a stretched rubber ligature.

- The contractile force of a moistened fiber.

A group of wedging forces, including screw force, the force of a pinched wire, and the force of a tightened wire ligature.

In the class of natural forces, the following fundamental types of force, employed for the correction of malocclusions, are included:

- The force of mastication.

- The force applied by training the accessory muscles of mastication.

- The spring force of the stressed alveolar process.

- The eruptive force of the teeth.

*Read before the Dewey Study Club, New York City, Dec. 13, 1927.

Before the further consideration of these forces is undertaken, the biologic standards that govern the application of these widely different forces must be determined.

Simply stated, the biologic requirements that should be respected in the employment of force are that pathologic changes must not be induced by the employment of any force, and in addition, that any changes produced through the application of a force should be similar in all essential respects to the same changes produced by the normal natural processes.

It is quite evident that artificial forces and natural forces require separate consideration with regard to the manner in which they affect the vital tissues.

In their investigations to determine the quality of artificial force, for inducing changes in the positions of the teeth, and for stimulating the development of the supporting structures of the denture, A. LeRoy Johnson¹⁴ and J. V. Mershon,¹⁹ whose opinions are widely accepted as expressing the best understanding of the times on the biologic aspect of the application of force, are in agreement that the quality of artificial force that conforms with biologic requirements is a gentle constant pressure that is just sufficient to stimulate cell activity. Any artificial force that exceeds that intensity is found to be detrimental to the tissues.¹⁵

Regarding the biologic conformity of the natural forces that are employed for the correction of malocclusions, the force applied by training the accessory muscles of mastication, the eruptive force of the teeth, and the spring force of the stressed alveolar process, all function along strictly normal lines, and therefore require no criticism on biologic grounds.

The force of mastication is capable of producing both normal and pathologic changes, and therefore requires separate consideration from the other natural forces to define the biologic standards that govern its application for the correction of malocclusions.

It is an accepted physiologic fact that any increase or decrease in the use of the muscles in any part of the body will cause a corresponding variation in the external form and internal structure of the associated skeletal parts.²² In the case of malocclusions of the teeth that are due to the maldevelopment of the supporting structures of the denture, the muscles of mastication and their accessory groups of muscles may be trained to reproduce the normal developmental environment that is lacking. Such measures are often successful in producing changes in the form and structure of the denture in a normal direction, in response to the stimulations induced. The fact must be recognized, however, that while the force of mastication influences the general development of the bony framework of the denture, its powerful intermittent character is not adapted for the production of localized changes. As a matter of fact, it is important at all times that the force of mastication be so distributed that it is sustained equally over the entire complement of the teeth. Even under natural conditions, when the entire force of mastication is thrown on a small segment of the denture, the affected teeth and their intimate supporting tissues are liable to suffer from the excessive burden they are called on to bear. This application of ex-

cessive natural force is recognized in the field of periodontia as a definite pathologic factor under the name of traumatic occlusion.

We may, therefore, state that the force of mastication is capable of being employed for producing general modifications in the form of the denture in a manner that conforms with biologic requirements. Because of its great intensity, however, it is not adapted for the production of localized changes in a manner that conforms with the essential biologic requirements.

Having determined the biologic standards governing the application of the various forces, we may now proceed to examine them individually, distinguishing the manner in which they conform with these standards, and explaining their manner of operation. The force of mastication and the force applied by training the accessory muscles of mastication, will be treated under the common head of muscle training because of their similarity for all practical purposes. The negative force of mastication, being descriptive of the manner in which the eruptive force of the teeth is called into play, is used in reference to this force.

The spring force of a distorted rod is a commonly employed artificial force. The intensity of this force may vary from a gentle constant pressure to one of considerable intensity, according to the dimensions of the rod and the extent of its distortion. By the choice of suitable dimensions, and proper adjustment, this force may be limited to a gentle constant pressure. This is the manner in which this force should be employed.

It may, therefore, be stated that the spring force of a distorted rod is capable of applying a gentle constant pressure that serves to stimulate cell activity in conformity with the recognized biologic standards.^{7, 19}

The elastic force of a stretched rubber ligature is also a commonly employed artificial force of an intensity that varies with the dimensions of the ligature, the number of ligatures used, and the extent of their distortion. When materials of practical dimensions are used, the intensity of the force applied is so great that it must be distributed through a large portion of the denture in order to reduce it within biologic limits. When adjusted in this manner, the elastic force of a stretched rubber ligature delivers a fairly constant force of gentle intensity that promotes cell activity. Another application of this force will be treated in its proper place.¹

The contractile force of a moistened fiber is another commonly employed artificial force. The particular feature of this agent is its unique property of exerting force continually after its initial adjustment. The intensity of the force exerted, when material of practical dimensions is used, is so great, however, that unless it is modified by other agents it exceeds biologic limits.²

Screw force,⁵ the force exerted by a tightened wire ligature,³ and the force exerted by a pinched wire⁴ are a group of artificial forces of a similar character that may be considered under the descriptive head of *wedging force*.

Wedging force describes the application of a force of considerable intensity that is generally applied by a minute adjustment of the particular agent. It is evident that such a force far exceeds biologic limits, so that un-

less employed in the approved manner, or modified by the use of other agents, the employment of wedging force is contrary to biologic dictates.

The spring force of the stressed alveolar process is a natural force that is called into play in a secondary manner that requires explanation. The high degree of elasticity possessed by the alveolar process, in common with all bony substance in the vital state,²² may be demonstrated by testing the mobility of a tooth on the application of very slight force and its ready return to its original position when relieved of the stress. The manner in which a tooth is suspended in its socket by the white inelastic fibers of the periodontal membrane, makes it evident that this movement is principally centered in the alveolar process.²⁰

Notice, however, that after an appreciable distortion, following the application of slight force, the alveolar tissues are able to resist a stress of considerable intensity without any further strain. These are the physical properties of bone²² that adapt it to its function and explain in a measure the physiologic changes in response to the minute adjustments delivered by the wedging types of agents, while the particular type of adjustment delivered by a moistened fiber, or rubber ligature, or the extended adjustment of a rod capable of exerting a force that exceeds the biologic limit, all involve the second reaction of the tissues and border on the incompatible with respect to the application of artificial force.

When otherwise excessive force is applied in regulation, this quality of the alveolar process lends its modifying influence and tends to transform it to one of gentler intensity that conforms more closely with biologic dictates. While this force is secondary in its action, the recognition of its positive influence is justified and actually imperative in this effort to reduce the empirical application of force in the correction of malocclusions.

In practice, this force is deliberately employed through the medium of the wedging types of force in particular. In this way, an original force of great intensity, delivered by a minute adjustment of a wedging agent, is modified to deliver a constant force of gentle intensity that persists as long as the alveolar process remains in its strained condition. By these means, physiologic stimulation of cell activity is induced through the entire part of the denture that has been subjected to distortion.

The negative force of mastication, as previously stated, is an artificial process for calling into play the eruptive force of the teeth. The eruptive process is generally dormant after occlusal relations have been attained. When a tooth is liberated from the force of mastication, however, this eruptive force may become active again, as may be noted in many mutilated cases in which the affected teeth erupt to a new occlusal level. Gottlieb has called attention, also, to the persistence of the eruptive force, resulting in the occurrence of traumatic occlusion, even when the stress of mastication is still supported.¹⁰

In practice, it is possible by means of mechanical devices, such as bite planes^{12, 13, 23} and obstructors, of which Young's overlays are an example,²³ to so direct and distribute the force of mastication that selected regions are

liberated from its stresses. This activates the natural eruptive force in the affected teeth and often results in their eruption to a desired level. We may, therefore, conclude that the force of mastication may be controlled and, in a negative manner, may induce changes in the positions of teeth in a manner that conforms with accepted biologic standards.

Muscle training describes the application of a force of a distinctly natural character. Muscle training aims to reproduce the natural developmental environment for the correction of malocclusions that are associated with improper functioning of the muscle groups that form the active environment of the denture. The methods employed for this purpose seek to accomplish this end by exercising the muscles more frequently, by improving the strength and tone of the muscles, and by directing the paths of action of the muscles to their normal channels.

The measures devised for the application of this force are as follows: A voluntary method of muscle training, developed by A. P. Rodgers,²¹ intermaxillary elastics,⁶ bite planes,^{11, 12, 13, 23} and obstructors.²³ The conclusion may be drawn that as a therapeutic measure for the correction of malocclusions, both in the active period of regulation, and in retention, the force applied by muscle training conforms with the best biologic requirements.

Having distinguished the actual forces that are responsible for the efficacy of orthodontic devices, we may proceed to examine some of the common devices employed for the application of force for the purpose of recognizing the particular forces exerted by each device. The practical value of this step is apparent for estimating the relative merits of different devices, for developing modified forms of existing devices, and for devising entirely new types.

The plain labial alignment wire, when adjusted to deliver a gentle pressure, applies the spring force of a distorted rod, which consequently applies the spring force of the stressed alveolar process. Excessive pressure exerted by this type of agent overcomes the first reaction of the alveolar tissues and is applied to the affected tissues in its original intensity.

The labial alignment wire with threaded ends is a compound device comprising screw force and the spring force of a distorted rod. Adjusted in the approved manner, this device applies a minute adjustment of wedging force that activates the alignment wire to apply the spring force of a distorted rod. This in turn involves the application of the spring force of the stressed alveolar process. When the adjustment of the threaded ends exceeds minute proportions, a force of considerable intensity is applied to the affected tissues, as with other agents that apply excessive force.⁷

The loop alignment wire employs the loop arrangement to control the application of force by this agent and also to modify the intensity of the force exerted by the distorted rod.^{8, 24}

An adjustment to the finger spring of a lingual body wire represents the employment of a rod of the proper dimensions to apply the spring force of a distorted rod with the intensity of a gentle constant pressure.¹⁹

An adjustment to an alignment wire with wire ligature applies wedging force to apply the controlled spring force of a distorted rod. This activates the alveolar tissues to apply the spring force of the stressed alveolar process.³

An adjustment to an alignment wire with silk ligature employs the contractile force of a moistened fiber to apply the spring force of a distorted rod, which in turn involves the spring force of the stressed alveolar process.²

An adjustment to a finger spring with silk ligature combines the contractile force of a moistened fiber and the modified spring force of a distorted rod.

An adjustment to a finger spring with wire ligature employs wedging force to apply the modified spring force of a distorted rod.

An adjustment to a body wire by pinching employs the wedging force of a strained metal body to apply the spring force of a distorted rod under control, which in turn activates the alveolar process to apply the spring force of the stressed alveolar process.⁴

Intermaxillary elastics exercise a compound influence. They exert the elastic force of a stretched rubber ligature distributed through the denture, and also introduce the force of muscle training.^{1, 6}

A separation ligature, when properly adjusted, employs the wedging force of a tightened wire ligature to apply a gentle constant pressure through the medium of the elastic alveolar process. When adjusted to exert excessive force this agent ceases to function in conformity with biologic principles.¹⁶

Obstructors, of the type of J. L. Young's overlays for deciduous molars, exercise a compound influence. They distribute the force of mastication, thereby inducing changes in the regions that escape the stress of mastication, through the operation of the eruptive force of the teeth. By eliminating obstacles on the occluding surfaces of the dental arches that interfere with the free action of the masticating system, they also introduce the force applied by muscle training.²³

Bite planes also distribute the force of mastication, thereby calling into play the eruptive force of the teeth. By engaging the denture in action more readily and therefore more frequently, and also by directing the play of the muscles, they also introduce the force of muscle training.^{11, 12, 13, 23}

The final phase of the application of force that will be considered is the biologic considerations involved in the different types of anchorage, displacement and fixation of teeth.

The fundamental types of anchorage are simple anchorage and stationary anchorage. Due to a particular biologic reaction, the resistance to displacement offered by a tooth, through the medium of stationary anchorage, considerably exceeds that through simple anchorage.⁹

These biologic properties are frequently employed to advantage for stabilizing selected teeth, and for rendering others more susceptible to displacement.

The fundamental types of displacement are tipping displacement and bodily displacement. Tipping displacement generally results from the appli-

cation of force through the medium of simple anchorage, and bodily displacement from the application of force through the medium of stationary anchorage.

Bodily displacement is frequently employed with the expectation of securing special development of bone in the basic regions of the denture. Lundstrom¹⁸ has examined the efficacy of appliances that induce tipping displacement and bodily displacement, with regard to the promotion of the growth of bone in the basic structures of the denture. From his findings, he concludes that bodily displacement manifests no decided advantage over tipping displacement for the achievement of that specific result.

The fundamental types of fixation are mobile attachment and rigid attachment. Mobile attachment is generally interrelated with simple anchorage and tipping displacement, while rigid attachment is interrelated with stationary anchorage and bodily displacement.

Ketcham has made a study of the effects on the internal tissues of the denture, of the action of different types of appliances. He reports a high percentage of apical root resorption of permanent teeth in cases where the teeth were subjected to the action of appliances that exercised rigid attachment, while such resorption was rarely observed where the appliances permitted mobile attachment.¹⁷

The following conclusions summarize the context of these points. Simple anchorage, tipping displacement and mobile attachment conform satisfactorily with biologic requirements. Stationary anchorage, bodily displacement and rigid attachment, while possessing mechanical advantages, are often biologically incompatible. Their employment should, therefore, be regarded with caution, and other means employed for securing their advantages that conform more closely with biologic requirements.

CONCLUSION

The scope of this work has included (1) a review of the accepted biologic standards governing the application of force; (2) the distinction of the different types of force applied by the devices employed for the correction of malocclusions; (3) the recognition of these fundamental forces in particular devices; (4) the consideration of the biologic factors involved in the different types of anchorage, displacement and fixation of teeth, factors intimately related to the application of force.

The aim of this work has been by these means, to eliminate the empirical application of force so far as the understanding of the times will permit, and to endow the operator with a familiarity with the range of agents at his disposal for the correction of malocclusions.

REFERENCES

- ¹Dewey M.: Textbook, Practical Orthodontia, Fourth edition, pp. 289-297.
- ²Idem.: p. 181.
- ³Idem.: pp. 182-184.
- ⁴Idem.: pp. 206-225.
- ⁵Idem.: p. 185.
- ⁶Idem.: p. 442.

- ⁷Idem.: pp. 187-199.
⁸Idem.: pp. 199-204.
⁹Idem.: pp. 283-285.
¹⁰Gottlieb B.: Lecture at University of Toronto, Oral Health, Oct. 1926.
¹¹Grieve G. W.: A Method of Stimulating Normal Growth of the Mandible, *Dental Cosmos*, April 1926.
¹²Hawley C. A.: The Principles and Art of Retention, *INTERNATIONAL JOURNAL OF ORTHODONTIA, ORAL SURGERY AND RADIOGRAPHY*, Oct. 1925.
¹³Jackson V. H.: A Consideration of Bite Planes in Orthodontia, *INTERNATIONAL JOURNAL OF ORTHODONTIA, ORAL SURGERY AND RADIOGRAPHY*, Jan. 1922.
¹⁴Johnson A. L.: Basic Principles of Orthodontia, *Dental Cosmos*, September 1923.
¹⁵Johnson, Appelton and Rittershofer: Tissue Changes Involved in Tooth Movement, *Proceedings of International Orthodontic Congress*, 1926.
¹⁶Johnson C. N.: *Textbook of Operative Dentistry*, Third edition.
¹⁷Ketcham A. H.: A Preliminary Report of an Investigation of Apical Root Resorption of Permanent Teeth, *Proceedings of the International Orthodontic Congress*, 1926.
¹⁸Lundstrom A.: Malocclusions of the Teeth Regarded as a Problem in Connection with the Apical Base, *INTERNATIONAL JOURNAL OF ORTHODONTIA, ORAL SURGERY AND RADIOGRAPHY*, Nov. 1925.
¹⁹Mershon J. V.: The Removable Lingual Arch Appliance, *Proceedings of International Orthodontic Congress*, 1926.
²⁰Neustadt E.: The Growth of Bone as Related to Function, *INTERNATIONAL JOURNAL OF ORTHODONTIA, ORAL SURGERY AND RADIOGRAPHY*, July 1927.
²¹Rodgers A. P.: Making Facial Muscles Our Allies in Treatment and Retention, *Dental Cosmos*, July 1922.
²²Thompson D'Arcy W.: *Growth and Form*, Cambridge, pp. 687-690.
²³Young J. L.: Rational Treatment of Infraocclusion, *INTERNATIONAL JOURNAL OF ORTHODONTIA, ORAL SURGERY AND RADIOGRAPHY*, Dec. 1923.
²⁴Idem.: Evolution, Construction and Manipulation of the Pin and Tube Appliance, *Proceedings of International Orthodontic Congress*, 1926.

Notes of Interest

Dr. Walter Coolidge Chapin announces the opening of a summer office at 130 Touro Street, Newport, Rhode Island. Orthodontia exclusively.

Dr. H. B. Robinson announces the removal of his residence and the opening of an office at 619 Rorabau Wiley Building, Hutchinson, Kansas. Practice limited to Orthodontia.

DR. DEWEY AND GNATHOSTATICS

BY DR. PAUL W. SIMON, BERLIN, GERMANY

AN EDITORIAL review of Dr. Lischer's translation of my book: *Fundamental Principles of a Systematic Diagnosis of Dental Anomalies*, appeared in THE INTERNATIONAL JOURNAL OF ORTHODONTIA for December, 1927.

I was rather glad for this review, not because it was laudatory—on the contrary, it was strangely faultfinding—but because I experienced the following vivid insight: If the opponents of gnathostatics can find no stronger objections and are unable to offer any better reasons for their criticisms, then my system cannot be in such a bad way after all, and it is perfectly clear why the number of converts continue to increase.

If certain unusual and important reasons did not call forth a reply, I might pass over Dr. Dewey's criticism in silence. The most unimportant and petty of these is the fact that Dr. Dewey appears to doubt the honesty of my scientific views. I believe one ought to pity, as well as ridicule, such an uncommon mode of criticism; it readily reveals the weakness of an assailant. Far more important is my fear that certain uninitiated, who would really find the new methods instructive and valuable, may let Dr. Dewey's unqualified condemnation discourage them in adopting their use. This would be unfortunate for the cause of orthodontics which, according to the testimony of many well-known authors, has taken a tremendous step forward because of their introduction. In the hope of preventing any such prejudice, I will attempt to invalidate Dr. Dewey's objections.

Dr. Dewey contends that I quoted Dr. Angle's classification falsely. He is so courteous as to say that he does not know whether I deliberately misquoted Angle's classification. My knowledge of Angle's work is based on the German translation of Angle's book, *Die Okklusionsanomalien der Zähne*, by Grünberg, of Berlin, and Oppenheim, of Vienna, two loyal and devoted followers of Angle. One may fairly trust them for a true translation. My quotation of Angle's classification is taken verbatim from this German translation.

Now, Dr. Dewey asserts that present-day pupils of Angle no longer follow the teachings of the master in every detail; and if I did not know of this plight then Dr. Lischer, my translator, should have known. This conception is truly remarkable, and for various reasons.

Above all, Dr. Lischer was merely to translate my work faithfully and literally; and I have been assured that he executed his task in a very surpassing manner. No translator is permitted to make critical corrections, because the reader wants, and should have, the original work of the author without alteration. If he, perchance, disagrees with the author in any manner he may, subsequently and at his leisure, take issue with him; hence Dr. Dewey approaches the ridiculous when he reprimands the translator.

At all events, it is unknown to me, even to this day, that Angle partisans have discontinued his three classes of malocclusion, or that they have extended them into a three-dimensional system. I, too, was an eager and passionate Angle disciple for years, and this despite the fact that I had become aware of "deep-" and "open-bites." Now the question under discussion is not that we should know that all bodily objects can only be comprehended in three dimensions. All of us learned this in school, long before we studied orthodontics. The peculiar fault of Angle and his pupils (even to this day) consists in this: In their classification they take only one dimension, the sagittal, into consideration, notwithstanding that the other two are equally important. Dr. Dewey's statement that present-day pupils of Angle consider the denture in three dimensions is a meaningless assertion. On psychological grounds I can readily understand Dr. Dewey's struggle; he attempts to present this matter as though the essence of gnathostatics was being taught by Angle partisans. Indeed, they cannot deny the success of cephalometric methods and, therefore, strive to avoid slipping into the rearguard. Dr. Dewey's editorial on "*Class II*," in the July, 1927, *INTERNATIONAL JOURNAL OF ORTHODONTIA*, is an interesting sidelight in this regard. An attempt to approach the gnathostatic viewpoint is very obvious here but without any practical results since he expresses himself entirely in generalities.

When Dr. Dewey reproaches me for falsely presenting the data of Angle, he equally rebukes Angle's pupils, since he admitted that they are gradually being weaned from the teachings of the master.

The criticism that I appropriated the sevenfold division of individual tooth deviations from Angle, without giving him credit, I reject. I gladly concede that I learned much from Dr. Angle's work; and when I call him "the father of modern orthodontics" (p. x), I believe I have expressed my high regard rather liberally. But I have also learned a great deal from other men; and I do not deem it necessary, or good form, to continually mention the names of my teachers. This is particularly true of such general acknowledgments as the sevenfold position of teeth which, as Dr. Dewey has very properly admitted, present an old and obvious geometric fact. Dr. Dewey's notion that I tried to appropriate this ancient fact as a personal discovery is, first, exceedingly naïve; second, it actually discloses the true, inner context. When Dr. Angle says that a tooth, or a group of teeth, are too short, or too long, he is in need of a scientific and objective criterion for the diagnosis and measurement of such anomalies. Gnathostatics presents such a basis for measurement, and this is the new discovery for which I may measurably claim some credit.

The following paragraph (p. 1085, below) is not very clear and is full of contradictions. Either Dr. Dewey did not study the appendix of my book: "On the Norm-Concept," or else he did not understand it. He seems to think that I associate reproof with the concept of a "fiction"; but he does not find it strange that I term the three-plane system a "fiction." He also ignores my confirmation that our scientific world of thought teems with fictions (Vaihinger), and that I merely discriminate between *more or less useful* fictions. Furthermore, he disregards the fact that I express myself more precisely

than he does, and especially that I consider the molar-constancy-dogma a "fiction." It is rather strange that Dr. Dewey evades this dogma with a mere passing word, notwithstanding that I criticized this, the weakest part of Angle's system, very thoroughly. He admits that my criticisms are applicable to the early writings of Angle, but immediately thereafter says that even now Angle's followers maintain that his classification is based upon the relations of the mandibular arch to the maxillary arch, to the face, and to the cranium. The unintelligible paragraph can have but one meaning: He gives us to understand that the molar dogma is not a fiction, but a "fact." This demonstrates, first, that I did not distort Angle's present-day teachings, or that of his followers, because it is valid even today (as Dewey himself establishes); second, he errs in the belief that all Angle students cling to the molar dogma. In the meantime, Oppenheim of Vienna, certainly a well-known interpreter of Angle's system, has shown that "an absolute constancy of the first molar does not occur" (Oppenheim, "Die Prognathie vom anthropologischen und orthodontischen Gesichtspunkt," an essay read before the V. Annual Meeting of the Edward H. Angle College of Orthodontia, Pasadena, California, February, 1926; *Zeitschrift für Stomatologie*, 1927, Heft 6). Oppenheim provides Dr. Dewey with another disappointment in propounding the following thesis: "It is neither admissible, nor feasible, to accept a jaw, a tooth within a jaw, or the relation of the same to a point on the head, as a point of departure for diagnostic purposes. Only the opposing relation of both jaws as observed in the teeth, provided the teeth occupy a normal position in their respective jaws, is satisfactory for diagnosis." Thus, Oppenheim does not merely attack gnathostatics, but also Angle's "key to occlusion," and disavows Dr. Dewey's contention that Angle's classification is based upon the relation of the dental arches to the face and cranium. (At another time and place I will discuss Oppenheim's work in detail and try to prove that the basic principles of his opinions are erroneous and his position untenable.)

The following sentence clearly shows Dr. Dewey's incomplete comprehension of cephalometric diagnostics: "Dr. Angle early found that the development of the face could not be studied by laws, but that different individuals must be considered according to type. Simon's 'law of the canine' as used in diagnosis of dental anomalies practically eliminates type, at least one would consider so after reading the book." If Dr. Dewey had understood my book, especially the appendix, then he would know that gnathostatics evolves the *type* with the aid of biometric methods by abstracting the mean of many typical characteristics of similar individuals. The orbital canine relation belongs to the type of white individuals (at least in Europe, and in all probability in North America). Angle and Dewey do not understand the concept of individuality. It seems as though they regard singular, divergent peculiarities as "typical" that which is "individual." This comprehension actually turns the matter upside down, the *abnormal* is jumbled with the *typical*. Of course, one frequently hears the remark: his prognathism is "typical of him"; or, parents of an orthodontic patient contend that their child's "type" has been altered by the treatment. This is entirely correct, if one thereby means a peculiar individual characteristic. But this lay

comprehension of the individual type must not be confused with the scientific concept of type, or with our norm. I believe I have made this sufficiently clear in the appendix of my book. (Compare also my essay: "On the Necessity of Gnathostatic Diagnosis in Orthodontic Practice," INTERNATIONAL JOURNAL OF ORTHODONTIA, 1926, xii, p. 1107.)

Dewey's reprimand that I quoted Angle's diagnostic definition of Class I incorrectly is of no real significance. I know very well what Angle means by the "key to occlusion," that the first molars are merely employed as diagnostic aids, or distinct points, for the determination of arch relations. No, this subject does not hinge upon such a trivial matter; it comprises far-reaching problems.

On p. 1086, middle, Dewey maintains that I conceive malocclusion as a mathematical problem, notwithstanding that it is an anatomic, or biologic, problem. Against this misrepresentation, which I regard as due to carelessness, I protest vigorously. Dewey quotes my sentence: "It is obvious that we are dealing with a mathematical problem." Immediately above (p. 40, in my book) occurs the following sentence: "The problem to be solved may be best expressed as follows: We must determine the exact position in the head of each individual element of which a denture is composed, so that every one who understands the survey (the ascertainable measure) is qualified to attempt a correct reconstruction." It is entirely clear, therefore, that I regard cephalometrics, not malocclusion, as a mathematical problem. Dr. Dewey's attempt to accuse me of ignorance of the simplest orthodontic concepts is not very complimentary to him.

In succeeding pages Dr. Dewey discusses the three-plane system and he quotes the following sentence: "The denture of man is an 'object' positioned in the head-cavity, and if its location is to be definitely determined, it must be measured in three dimensions." The word "definitely" is probably misunderstood. In the German edition of my book the expression "räumlich genau" is used, which means "exactly in space" (relating to space, spatially). The opposite conception of Angle's one-dimensional comprehension is meant. My sentence: "When we speak of exact measurements we always imply that they are relative" is the conclusion of a discussion the clear meaning of which is: It is very difficult to comprehend the head by measuring it because it is a living biologic, not a dead geometric, structure. Consequently our measurements have to be evaluated accordingly, i.e., relatively: *they are as exact as the object permits; namely, relatively exact.* (To make this clearer, I would remind Dr. Dewey of the many useful diagnostic methods of measurement employed in general medicine; e.g., temperature, blood-count, percussion, auscultation, etc., etc., all of which are *relatively exact*, yet indispensable and blessed.)

Dewey quotes my sentence: "Consequently it is impossible to discover permanent mathematical relations of the facial portion of the head, which we could accept as a basis for measurements." A simple example will make my meaning clear. Thus, I can state that the equator is 40,068 kilometers long, but I cannot state that the cranial base is 8 centimeters long because the measure changes. However, I can state that the mean, or normal, height

of Canadians (Quetelet) is 67 inches, or that the normal brain-weight of Swedish men is 1375 grams. And the method of gnathostatics is that of biometry. Perhaps Dr. Dewey will never comprehend this difference, in which event I must request him not to speak of a contradiction.

In the following, Dewey throws two entirely different matters into the same pot. When I say that measure-points should be easy to locate and as exact as possible, my meaning is entirely clear. The basion would be acceptable as a measure-point, but it can only be used on crania. Another point, termed glabella, cannot be determined accurately, like the point of the mandibular joint, notwithstanding that these would be very useful. Owing to the particular characteristics of the biologic object, we are forced to accept a compromise. But the question whether our chosen measure-points are uninfluenced by anomalies of the jaws is an altogether different matter, and one on which I expressed myself rather fully in my book. At all events, the question of the ease with which these measure-points can be located accurately is in no way related to the question of their exemption from influences related to dental anomalies. Therefore, when Dr. Dewey regards these as a contradiction, it is obvious that he failed to understand the logic of the situation.

Dr. Dewey may not understand "how the median plane is going to be of any great value and how any diagnosis based upon the median plane will be anything more than a guess." He says so because I have stated that the median plane is an artificial construction, because there is no natural median plane. This is like doubting the necessity of legal procedures, because the concept of justice is only a fiction. Yet we all know that this fiction is of the greatest value, the only guaranty of man's social life. We know, too, that great variations occur in the application of this fiction, that there is nothing absolute about justice, that it is, nevertheless, a useful fiction. Furthermore, we cannot discard this concept. And this is exactly our predicament with the median plane. If Dr. Dewey would occupy himself more fully with the sciences of anthropology and craniometry, he would know that such fictive planes like the median and a hundred others have been used for a long time by earnest investigators, and with fruitful results. With this in mind, I wrote my sentence: "Now that the indispensable, exact methods of investigation have been explained from the philosophic point of view (and if the reader will bear their principles in mind), a presentation of our own methods may begin." Dr. Dewey tries to criticize me at every turn (which is very disheartening) and he does not seem to observe that I evaluate my methods as discreetly as possible. I do not say that my methods are indispensable, but I am speaking of exact methods generally. I cannot judge whether the translation gives a different meaning to my words, hence I here repeat the sentence from the German edition: "Nunmehr dürfte auch vom allgemeinphilosophischen Gesichtspunkt aus die Unentbehrlichkeit exakter Untersuchungsmethoden hinreichend bewiesen sein, so dass wir in steter Erinnerung an die geschilderten Grundlagen die Einzeldarstellung und Prüfung unserer Methoden beginnen können."

Dr. Dewey charges me with an imperfect knowledge of geometry, because he believes I gave a false definition of a plane. I acknowledge that I did not investigate the matter in a dictionary, because I felt reasonably certain that I knew. Meanwhile, Dr. Dewey did some hasty reading. I did not attempt to *define* a plane, but how one may *determine*, or locate, a plane spatially, "with the aid of three points not in a straight line." This latter declaration is absolutely correct, and Dr. Dewey may perhaps find it so in his textbook.

Dewey then takes up the orbital-canine law, which quite naturally is a bone of contention to an orthodontist. Dewey claims that this law "has been disproved by many men." Personally, I know only of a few who have tried to disprove it and none of these have investigated my findings with *my methods*, which is an essential requirement. Practically all of them have used their own, mostly craniometric, partly indirect, methods which must necessarily yield different results. I have also observed that some of these opponents do not understand the biometric meaning of the law. I might mention a much larger group of investigators and practitioners (even among Americans) who have tested the law in accordance with my methods and who have confirmed my findings. Some of these have published their results, many others have written letters of assurance and all, without exception, have declared themselves as to the value of the law and the usefulness of gnathostatics.

When we speak of the "canine region" we certainly do not mean most of the denture, as Dewey ironically intimates. We mean only the region of the canine, not even the first premolar or lateral incisor region. Of course, it is obvious that we do not expect to attain astronomic precision with biologic objects. Everyone understands this except Dewey, who evidently does not want to understand. But he ought not to forget that Angle disciples accepted the first molar as a fixed point for well-nigh thirty years.

My statement that the biologic exactitude of the measure-points does not invalidate a diagnosis, that the latter is nevertheless exact, is no empty dream, and every practitioner with training and experience in gnathostatics will corroborate me. Of course, the orbital points are not always marked on the same spot to a hair's breadth; but after adequate training one may perform this detail with every assurance. For example, I have several series of gnathostatic casts which I have made of the same children at intervals of several months for the last six years, and the orbital plane passes exactly through the same respective points of their teeth. A twofold result is thus demonstrated: First, that gnathostatic technic can be executed in a very exact manner; and second, in these children a very uniform frontal growth of the orbital points and dentures is taking place. Now, I contend that if an inexperienced practitioner errs in marking a measure-point to the extent of one, or two, millimeters, it will have no further practical effect on the diagnosis than to alter the degree of the anomaly disclosed. In other words, a mandibular retraction will never be mistaken for a normal mandible, or for a mandibular protraction. Naturally, I am not defending bunglers who have not acquired the technic. But Dr. Dewey's utter misunderstanding of cephalometrics and its functional significance is revealed in a classical man-

of Canadians (Quetelet) is 67 inches, or that the normal brain-weight of Swedish men is 1375 grams. And the method of gnathostatics is that of biometry. Perhaps Dr. Dewey will never comprehend this difference, in which event I must request him not to speak of a contradiction.

In the following, Dewey throws two entirely different matters into the same pot. When I say that measure-points should be easy to locate and as exact as possible, my meaning is entirely clear. The basion would be acceptable as a measure-point, but it can only be used on crania. Another point, termed glabella, cannot be determined accurately, like the point of the mandibular joint, notwithstanding that these would be very useful. Owing to the particular characteristics of the biologic object, we are forced to accept a compromise. But the question whether our chosen measure-points are uninfluenced by anomalies of the jaws is an altogether different matter, and one on which I expressed myself rather fully in my book. At all events, the question of the ease with which these measure-points can be located accurately is in no way related to the question of their exemption from influences related to dental anomalies. Therefore, when Dr. Dewey regards these as a contradiction, it is obvious that he failed to understand the logic of the situation.

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ner by his criticism of my sentence: "The eye-ear plane is used as an unchanging basis for these measurements, and in relation to which the face grows upward and downward." His comment is as follows: "The author presents no evidence to prove the above startling statement." Some day he may consult the well-known "Textbook of Anthropology" by Rudolph Martin, or any other accessible work. There he will find that the vertical development of the skull is always measured from the eye-ear plane. And I meant nothing else. "Startling" is therefore due to Dr. Dewey's imperfect understanding. From the many references in my book I need only quote this one (p. 364): "This E-E plane is an average fiction. A 'natural' (real) horizontal plane, an empirical anatomical plane, does not exist."

On principle, I must reject a comparison of gnathostatics with Dr. Stanton's scheme. These two systems have an entirely different aim and, therefore, utilize totally different methods. One cannot compare an automobile and an aeroplane. And Dr. Dewey is ill-prepared to pass judgment on the sources of error in gnathostatic technic because he very evidently has not mastered it. I can assure him that his reflections are of no practical significance. One could entertain similar doubts about the restoration of a rubber plate, but the fact remains it fits admirably. "All theory, dear friend, is colorless" (Goethe).

The criticism which Dewey allots to photostatics is very humorous, though involuntary. Here, again, one may point out his unfamiliarity with fundamental anthropologic principles of measurement. It is really superfluous to waste any words on this matter. But Dr. Stanton (whose methods Dr. Dewey praises and whom he regards as one of my opponents) concludes that "Simon's plan to photograph all patients in the same relative position is worthy of adoption." Now it is illogical to praise three-dimensional orientation for the face (photostatics), but to criticize it for the denture (gnathostatics).

Dewey next attacks my nomenclature. He errs when he believes that I took the terms "contraction" and "distraction" from the English. They have come to us through the Latin, and Dr. Dewey must know that medical terms have long been coined from the Latin and Greek; his native language is very largely Roman, containing Latin elements. My other terms: "protraction, retraction, attraction and abstraction," are also from the Latin. Of course, I knew that some uninformed person might misunderstand them, hence I expressed myself as follows on p. 244 of my book: "One may dispute the appropriateness of my nomenclature, but surely no one will conclude that because of the origin of the root syllable 'traction,' = 'to draw,' that a contraction has its origin in a 'drawing together.' A superficial consideration might confuse it with the orthodontic term 'contract,' as applied to the dental arch, etc., etc." Apparently Dr. Dewey overlooked this statement in my book; but he might have gathered from the entire scheme of gnathostatics that my terms were not meant for the description of dynamic or etiologic conditions. Notwithstanding, he has the boldness to write the following: "We have long spoken of 'contracted arches' used to describe the condition which Simon refers to as 'contraction,' but we have also called attention to the fact that

the so-called contracted arch is generally not a contracted arch but an underdeveloped arch." I must state rather frankly that I regard such a procedure on the part of a scientific critic as disgraceful. On the other hand, I marvel at his diligent consultation of a dictionary. He really ought to look up the meaning of "synonym." Now, there really is no danger that a dentist, certainly not an orthodontist, would regard an upper distraction as a mental disorder of the patient (or of the upper jaw). He is right when he says that contraction and distraction are not opposite terms, if we use them as general terms of the English language (without any relation to orthodontics). But they are opposite terms if we know that they are words of Latin origin used as diagnostic terms in gnathostatics. In Latin "con" means *together* and "dis" means *apart*. Probably Dr. Dewey will continue his philological reform, because there is ample opportunity in dentistry. Isn't it intolerable that dentists have long suffered the use of "crown" and "bridge"? One can so easily mistake these for a king's crown and a railroad bridge. Dewey's discussion of my terminology provokes the sprightly impression of unintentional comicality. Only his aim to discredit gnathostatics and to speculate on the reader's naïveté seems voluntary. I am convinced that he deceived himself. He says he can't see "how Simon's terminology can be taken seriously in America." I believe that my terminology has better prospects than his criticism. (The terms "protrusion" and "retrusion," used by a great many orthodontists, are no better than mine. They are derived from the Latin verb "trudere" = "to push.")

Dewey concludes his criticism with the declaration that the idea of gnathostatics, namely, the evaluation of the relations of the denture to the head, is not new; that it has been known to a great many men for years. He fails to note that it is not a question about a vague and indefinite idea, but about the practical utilization and the systematic construction of cephalometric diagnostics, whereby heretofore hazy concepts (especially that of "norm" and "anomaly") are logically defined; and that with the aid of biology and biometry they are definitely established. I confidently leave it to the judgment of alert, impartial and conscientious readers of my book to designate that which is "new." Personally, I attach no value to the confirmation of the "new," but am content with the fact that an increasing number of orthodontists express their conviction that we are on the right road.

Finally, Dr. Dewey closes with a very beautiful and witty bon mot: "The part of Simon's classification that is true is not new and the portion that is new is not true." Since he is a prominent orthodontist, I would like to convey to him my impression of his criticism of gnathostatics by quoting the following Latin phrase: "si tacuisses, philosophes manisses!" In English this means: If you had kept silent, you would have remained a wise man!

Case Reports

TREATMENT OF UNILATERAL DISTOCCLUSION CASES*

BY JOHN V. MERSHON, D.D.S., PHILADELPHIA, PA.

I WAS guided in my selection of a subject for this case report by the numerous references I have heard made regarding the difficulties encountered in the treatment of unilateral distocclusion cases. This discussion is not intended to deal with diagnosis. All of the second series of models were taken in modeling compound over the appliances which were employed in the treatment of these cases. The photographs of the models show the results together with the appliances used in producing the results. This report is intended to deal only with the treatment of unilateral distocclusion. Any other malocclusion that may exist in these cases is disregarded in this report.

I am at variance with the old theory as to the constancy of the maxillary first molar, since my first step in the treatment of the so-called unilateral distocclusion is to determine whether the maxillary molar tooth is mesial to its normal position or whether the mandibular molar is distal to normal. The two different types of cases require an entirely different mode of procedure in treatment.

FIRST TYPE OF UNILATERAL DISTOCCLUSION

I shall first describe the method of procedure in the treating of a case in which the maxillary molar tooth on one side is mesial.

In treatment I endeavor to move the maxillary molar distal and proceed in the following manner: by placing a mandibular lingual arch in contact with the lingual surfaces of all of the lower teeth, with a hook on the mandibular molar band for an elastic on the side which is abnormal. Then place maxillary molar bands with a labial arch adjusted so that the arch will be in contact with the maxillary anterior teeth, yet perfectly passive. Then solder stops on the arch just in front of the buccal tubes so that the arch cannot pass farther into the tubes.

The next step in treatment is to pull the labial arch out of the tube on the side which is mesial, far enough so that it will clear all of the anterior

Fig. 1.—Shows right side of models of the same case before and after treatment. The model *without* appliances is the original model and shows that the maxillary molar tooth on this side has drifted forward. The model *with* appliances on shows the results accomplished by moving the maxillary molar distally. The appliance used in this treatment is in place, excepting the rubber elastics.

Fig. 2.—Shows the left side of the same case (Fig. 1) with normal molar relation in both models.

Fig. 3.—Shows occlusal view of the original models; also the models after the mesio-distal relation has been corrected with appliances in place. Note the lingual arch is in contact with all teeth for the purpose of establishing stability.

*Case report read before the Twenty-sixth Annual Meeting of the American Society of Orthodontists, Chicago, May 2-5, 1927.

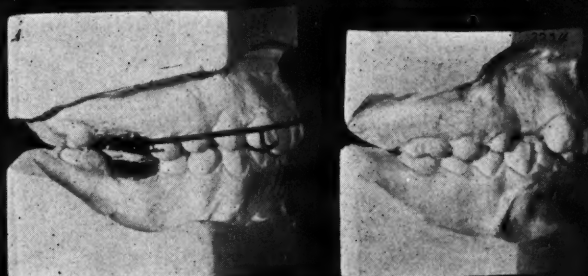


Fig. 1.

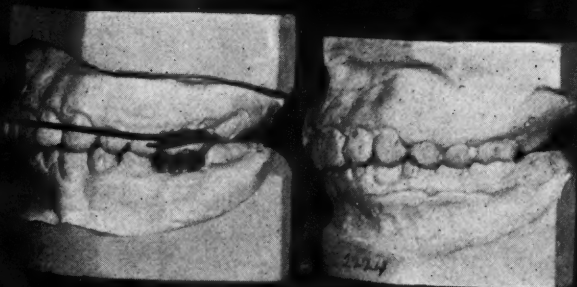


Fig. 2.



Fig. 3.

teeth and as much farther as we can without interfering with the lips. Then solder another stop on this side in front of the buccal tube.

A hook should be soldered to the labial arch for intermaxillary elastics on the affected side far enough mesial to allow the elastic bands to give the necessary pull. After the arch has been fastened in place, have the patient start to wear the elastic bands on the one side only. When the maxillary molar has moved sufficiently distal so that the labial arch is in contact with the maxillary anterior teeth, again pull it slightly out of the tube on that side and solder another stop. On the side that is mesial we allow the labial arch to extend through the tube far enough to allow for this pulling out at intervals. This process is continued until the correct mesiodistal relation has been established.

SECOND TYPE OF UNILATERAL DISTOCCLUSION

The following is the method used in the type in which the mandibular molar is distal to the maxillary on one side.

In treatment we proceed in the following manner: First, place bands on the maxillary molars with buccal tubes for the labial arch. Make the labial arch and adjust it so that the arch is in contact with the maxillary anterior teeth and at the same time solder stops on the arch in front of the buccal tubes. Then, on the mandibular, place a molar band on the side that is distal only, *without* a lingual arch. Solder a piece of wire at the mesio-buccogingival angle, pointing mesially, and bend it in such a manner as to form a hook which can engage the rubber elastics.

At times you may want to extend this wire far enough mesial to enable it to rest against the second premolar tooth. Solder a hook on the upper labial arch in such a position that it will give the required tension and proceed in the usual way of having the patient wear the elastics on the one side only. This will at times produce a slight rotation of the mandibular molar, but this can afterwards be very easily taken care of, but in many cases this rotation does not occur.

The difference to be noted in the mode of procedure in the two types of cases is that in the first type, where the upper molar has drifted forward, the mandibular lingual arch is very necessary and the maxillary labial arch should stand off from the anterior teeth, while in the second type, where the mandibular molar is really distal, the mandibular lingual should be entirely omitted and the maxillary labial arch should rest in contact with the maxillary teeth.

Fig. 4.—Shows the position of the labial arch resting against the upper anterior teeth.

Fig. 5.—Shows the arch pulled out of the tube so that it is free from the anterior teeth. This picture is probably an exaggeration over what we would do in practice, but this was necessary for the purpose of showing it in a slide.

Fig. 6.—Shows the left side of the original and corrected models. The one *without* appliances is the original and shows the mandibular molar in distal occlusion. The one *with* appliances shows the mesiodistal relation corrected with appliances in place that were used, all except the intermaxillary elastic bands.

Fig. 7.—Shows the right side of the original and second model with mesiodistal relation normal.

Fig. 8.—Shows the occlusal view of the original models together with the models after the mesiodistal relation has been corrected, with appliances in place, showing the maxillary labial arch in contact with the maxillary anterior teeth and the stops against the buccal tubes; also showing the band on the first molar on the side which was distal *without* any lingual arch, allowing all possible freedom in movement and tissue adjustment.

Fig. 9.—Is an enlarged view showing the molar band with a hook. The reason for placing this hook in the mesio-buccogingival angle, when no lingual arch is used, is self-evident.



Fig. 4.



Fig. 5.



Fig. 6

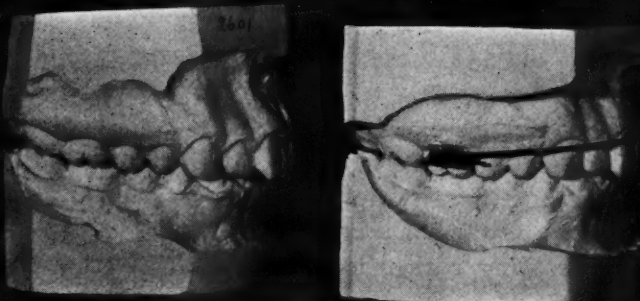


Fig. 7.



Fig. 8.



Fig. 9.

THIRD MOLAR INTERFERENCE (CASE REPORT)*

BY DR. P. G. SPENCER, WACO, TEXAS

THE complications arising from the third molars are not really of greater moment than in times past, but only seem so, in the light of a better and more careful diagnosis, which assists us to a more practical prognosis.

Regardless of many and various conflicting opinions, it becomes apparent from careful study of the literature and personal observations that less than 30 per cent have sufficient room for proper eruption into position of the third molar. I do not mean that that is the proportion from your patients, or those under orthodontic treatment, but applies generally.

This ratio was very forcefully impressed upon me during the late war, when during a period of over a year I was assigned to the Surgical and Examination Division of Camp Beauregard, La. A majority of our patients were those arriving at, or recently had passed, the time when the third molar should normally be erupting into position. The percentage of those free from third molar symptoms was very small, and a large percentage of those free from trouble were mutilated cases that had previously lost teeth anterior to the third molar; thereby relieving conditions to a great extent.

The above refers only to those of the Caucasian race, as in addition to the above duties, several weeks were spent in the receiving station for new men coming into service through the draft system. During this period one contingent of over 8000 Negro civilians from Southern States impressively proved the opposite findings: true blood types frequently having fourth molars; a great many of them having ample room for a fourth molar, this space noticeably decreasing with mixing of types and environments; possible third molar impactions were nil.

This apparent straying from my subject is in reality a very definite orthodontic aid; apparently third molar complications are the result to a more or less extent of our so-called modern civilization; our modern environment, being simply a lack of usage of part, forces Nature to follow the slow process of elimination. In all mesiocclusions I am very positive early removal of the third molar will be of great assistance even with or without orthodontic interference; even if primarily internal secretions may be at fault. Such cases usually present underdevelopment of the maxillae, and I have previously held that the retention of the maxillary thirds would assist in the treatment of these cases; however, in a majority of them, supraclussions or open-bite conditions rapidly develop, and serious consideration must be given to the necessity of the removal of the maxillary third molar as the impacted condition is apparently producing an elongation of the maxillary second and first molars. In some twenty-five or more cases of this type, of twelve to fifteen years of age, we have found it advisable to remove the second

*Read before the First International Orthodontic Congress.

molar instead of the third molar, care being given of course to check up carefully the position and condition of the unerupted third.

In passing, it might be worthy to note that a majority of these cases present acromegalia symptoms. The osseous structure of the mandible becoming enlarged, excessive thickening of the alveolus buccolingually, and apparent failure of all the teeth to fully erupt. This phase carries us into the realm of endocrinology, which is daily becoming a greater field of investigation along with orthodontic treatment.

An opposite position is presented in distocclusions. Here the mandibular third molar is a very efficient help, and if successful development anteriorly is gained in the mandible (and by successful development, I mean permanent results), cannot, except in a few exceptional cases, be accomplished by exclusive use of intermaxillary elastics. My desire, if optional, being to treat such cases previous to the tenth or eleventh year, and in a majority of these cases the mandible will normally and permanently move or develop forward of its own accord, assisted by the second molar erupting. At even this age several teeth may be moved in sections, and in all cases after twelve years of age I find this method most successful and am greatly assisted by the erupting mandibular third molar; even though later its removal is also positively necessary if anterior overlapping or crowding is to be avoided.

I recall a paper presented to this Society several years ago in Chicago. The essayist's suggestion of the extraction of the second molar seemed to be a very radical step; however, a very careful study of numerous radiograms of cases that have not been treated, together with what we have evadingly termed relapsed cases, gives ample evidence that retention of the complete molar series is not possible or practical, except in a small percentage of cases. If I remember correctly, it was stated one reason for removal was the extreme bell-shaped crowns of the second molar. This possibly played a very small part in the cause of the trouble only in so far as giving a greater fulcrum to the unerupted third, and in all cases other than supraclussions, everything else being equal, the removal of the impacted third, even if attended with greater difficulty, would be the proper procedure. Radiographic findings would greatly assist diagnosis.

Early and constant radiographic examination is our greatest ally. In my own practice, I must confess that such examinations were first confined to such cases in which an abnormality was clearly present; then as unsuspected missing teeth cases were becoming more frequent and making necessary a change in our treatment, the routine examinations were made before any orthodontic treatment. I do not believe any diagnosis can be but added guesswork without it. Events have since conclusively proved that even the above is far from sufficient. The second dentition must be kept under observation, and after the twelfth year the future of the third molar must be decided upon.

The unerupted or impacted third molar is equally our problem in an orthodontic sense, as is the malposed canine. Its inability to erupt or improper progress in erupting is a very important problem to us, not only to



Fig. 1.



Fig. 2.



Fig. 3.



Fig. 4.



Fig. 5.



Fig. 6.

the results of our previous treatment, but during our treatment, while it is yet in a developmental stage.

Such examples, though possibly uninteresting as a subject of discussion, are real problems resulting from the third molar in orthodontic practice. The radical decision to remove any or all third molars in all cases under orthodontic treatment except under the most favorable prognosis would be

bordering onto malpractice, for when conditions permit placing them into proper position, their value from a retention and mastication standpoint is very apparent.

You of course realize the difficulty in reproducing satisfactory radiograms; the angle of the rays may also be misleading. However, Fig. 1 definitely shows an impaction, evidence of supraclusion of the first molar. This case was developing slight open bite conditions, with crowding of maxillary incisors, some two years after conclusion of treatment. The trouble disappeared with removal of third molars.

Fig. 2 shows duplicate case and after results as in Fig. 1.

Fig. 3. The maxilla, in which the removal of second molar secured satisfactory results.

In Fig. 4 the position of third contraindicates removal of second molar.

Fig. 5 shows five congenitally absent teeth in the maxillae, all teeth present in the mandible. Open bite. Removed mandibular first molars. A mesiocclusion case. Note elevated first molar. After results of treatment very satisfactory.

Fig. 6 shows occlusion apparently perfect five years after treatment. No crowding in incisor region. Complete radiograms show all third molars were congenitally absent.

Radiograms could be shown of over one hundred cases; however, duplicates can be found in your own practice equally as well. One general suggestion that has been found safe to follow in the mandibular arch is, "The angle of the ray being correct, at least two-thirds of the crown of the mandibular third molar should lie anteriorly to the outline of the external oblique ridge; otherwise some decision must be made regarding removal. Careful consideration to age, stage of development of patient, must, of course, be given."

Reproduction of numerous models shown at clinics is unnecessary, as from a careful examination of models of your own cases or those a few years after treatment or soon after the twelfth or fourteenth year, you will note torsion in the molar region, usually the second molar, overlapping in canine and incisor regions. A large percentage of our so-called easy neutroclusion cases will show conclusive evidence of an overabundance of tooth structure in the molar region and will possibly explain the difficulty we are having in our attempt to gain development in the anterior region, and when such development is gained we discover we have a lack of harmony for that individual.

Wisdom is knowing what to do.

Skill is knowing how to do it.

Virtue is in doing it correctly.

Clinics

CLOSING SPACES OCCASIONED BY THE ABSENCE OR LOSS OF PERMANENT TEETH*

BY HUGH G. TANZEY, KANSAS CITY, MO.

CASE seven years of age. After seven years of intermittent treatment and observation it was decided to extract the maxillary first permanent molars. The maxillary left lateral, canine and first premolar were being crowded

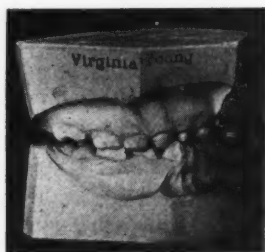


Fig. 1.

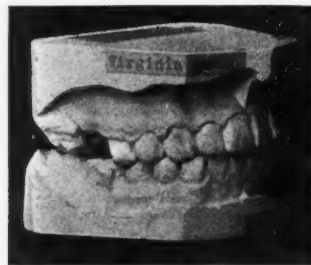


Fig. 2.

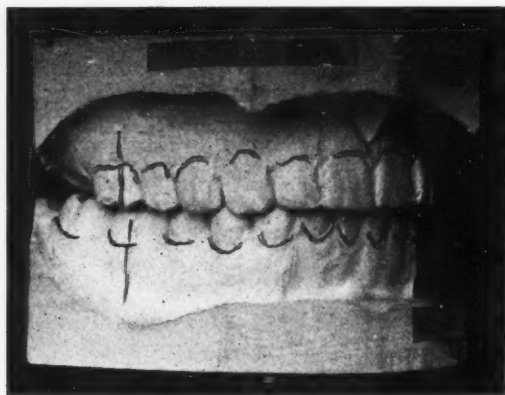


Fig. 3.

out of alignment by the erupting third molars. The x-ray showed an absence of mandibular third molars; caries and fillings in the upper first molars were considered sufficient evidence to justify the sacrifice of those teeth instead of the second molars.

Fig. 1 shows case in beginning—age seven years.

Fig. 2 shows case after extraction of maxillary first molars at age of fourteen years.

*Clinic presented before the Twenty-sixth Annual Meeting of The American Society of Orthodontists, Chicago, May 2-5, 1927.

Fig. 3 shows case at age of seventeen years, after eight years of intermittent treatment and rest periods, and ten years of observation.

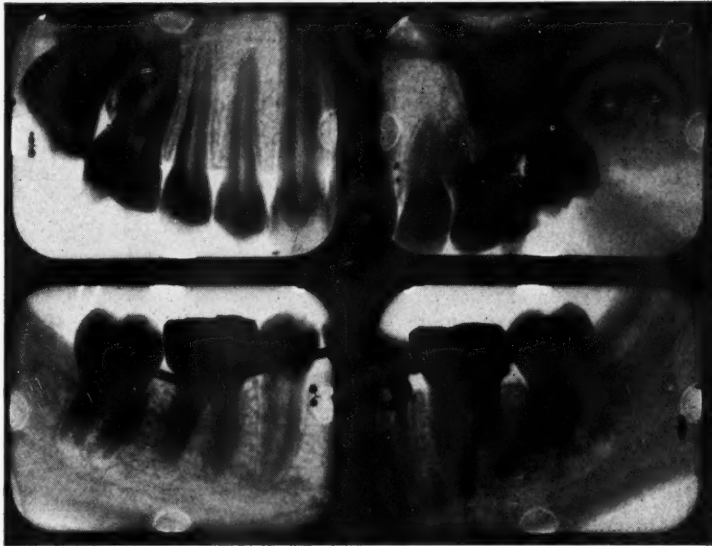


Fig. 4.



Fig. 5.

Fig. 4 shows teeth before extraction, and Fig. 5 after extraction and closing spaces.

We hope to make further reports on the case after the eruption of maxillary third molars.

PLASTER MODEL-FORMER
AND
FACE BOW FOR LOCATING OCCLUSAL PLANE*

By L. J. PORTER, D.D.S., NEW YORK CITY

PART I—MODEL-FORMER

THE plaster model-former as shown has been previously described in its original form in the proceedings of the International Orthodontic Congress and also in the May, 1927, number of the INTERNATIONAL JOURNAL OF ORTHODONTIA, but since then some decided changes have been made in its



Fig. 1.

construction. These changes so greatly increased its efficiency and ease of manipulation that another clinic was warranted at this meeting of the American Society of Orthodontists.

The three anterior sections are now made of Monel metal which is unbreakable and does not tarnish. The side arms have been made slightly higher, and on account of the change in shape of the anterior sections, the side arms are unlimited in flexibility, so that they can accommodate any size model from the very small to the extra large casts (Fig. 1).

*Clinic presented before the Twenty-sixth Annual Meeting of The American Society of Orthodontists, Chicago, May 2-5, 1927.

The technic of operation is the same as previously reported, except that we now build a wax platform over the lingual of the lower impression before pouring the anatomic portion with stone. This eliminates carving in the lingual section after moulding in the model former.

After the upper base has been poured, the lower anatomic portion is put into occlusion and held in place with adhesive tape rather than using sticky wax as was previously done (Fig. 2).

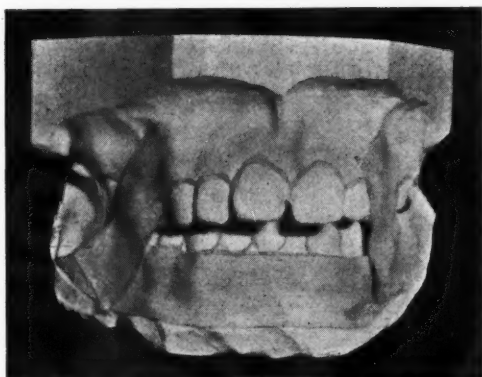


Fig. 2.



Fig. 3.

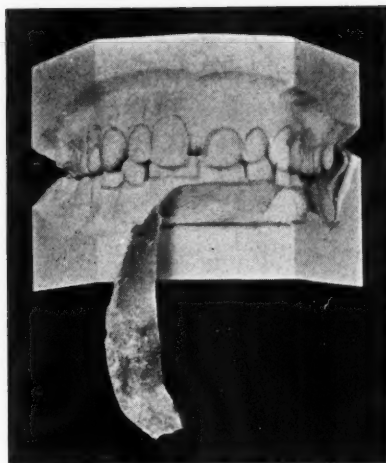


Fig. 4.

The dividers now being used are made of Monel metal and have a fixed ratio of 1, 3, and 4—1 for the art portion, 3 for the anatomic portion and 4 for the total height of the model. This greatly facilitates calculations of measurements and eliminates possibilities of mathematic errors (Fig. 3).

The remainder of the model-forming procedure is the same as previously described. Fig. 4 shows a completed model to the last stage of removing adhesive tape from the lower model. It will be noted that the plane of occlusion is parallel to the bases.

Part II shows the technic of making the occlusal plane in the model as related to the eye-ear plane in the head.

PART II—FACE BOW

Believing that the incline of the plane of occlusion in the head has a definite bearing on diagnosis and retention, it became necessary to devise a method whereby this plane could easily and accurately be determined and used in the model former.

The fact that this plane is of value to us before treatment, was emphasized to me recently when talking to one of our prominent orthodontists who

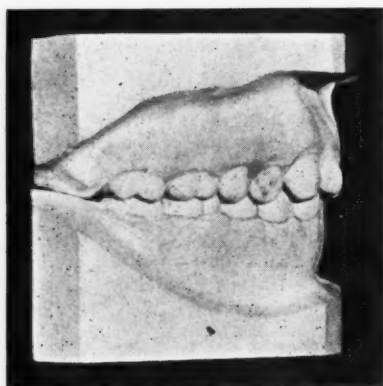


Fig. 5-A.

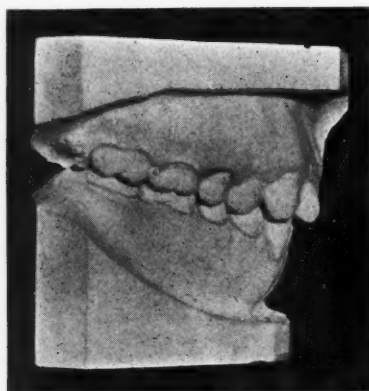


Fig. 5-B.



Fig. 6-A.



Fig. 6-B.

told me of a case of distoclusion which we had corrected three times and had been unable to retain. He then made a model by the Simon method which revealed a plane of tremendous incline. His conclusion was that, because of the muscular pull in such cases being directly opposite to the movements gained, the treatment and also particularly the retention was made much more difficult.

A very interesting study of this phase may be gained through viewing the cases shown by Dr. O. W. Brandhorst, of St. Louis, at the International Orthodontia Congress and reported in the reports of that meeting on page 602. It will be noted here that there are only four or five out of the 52 cases

shown which have an exceptionally steep incline. If it is true that on account of the muscular pull the correction of the distal condition of the mandibular arch is much harder to retain in such cases, it would undoubtedly be of great value to know this before treatment.

The difference in models so mounted as compared with those mounted with the plane of occlusion parallel to the base is shown by Fig. 5-A and Fig. 5-B. These models are made from the same set of teeth.

The technic of using the face bow is very simple and can be easily and quickly used on the patient to get an accurate record of the position of the plane of occlusion.



Fig. 7.

Fig. 8.

The face bow is made of Monel metal and consists of three parts: two side pieces and a tongue or flat tray, all of which revolve from a riveted center.

Fig. 6-A shows the face bow with the tongue extended ready for locating the eye-ear plane, together with the dividers used in conjunction with the bow as shown in operation in Figs. 9 and 10.

Fig. 6-B shows the face bow ready for insertion in the mouth as illustrated in Fig. 11.

The object of the face bow is to give a piece of compound, the base of which is parallel to the eye-ear plane. This in turn is later used in the model-former to determine the location of the plane of occlusion, making it in the same relation to the base of the model as it is in the head related to the eye-ear plane.

A pencil mark is made at the lower part of the orbit below the pupil on each side (Fig. 7).

Another pencil mark is made at the tragus of the ear or the highest point in the margin of the auditory meatus (Fig. 8).

The face bow with the tongue extended is placed over the face touching the eye and ear points. The face bow is then resting in the eye-ear plane. With a pair of dividers a measurement is made from the eye-ear plane to the incisal edge of the upper incisor teeth (Fig. 9).

The divider with this measurement is then carried back to the mark on the tragus and another mark made on each side of the face near the angle of the mandible (Fig. 10).

Since these marks are the same distance from the tragus as the incisal edge of the teeth are from the eye mark, another plane has been established which is parallel to the eye-ear plane.



Fig. 9.



Fig. 10.

The face bow is now used with the tongue turned to the inside as shown in Fig. 6-B. A piece of compound is placed on the tongue of the face bow and made higher in back than in front (Fig. 11). It is then placed in the mouth and pushed up in front until the edge of the incisors go *through* the compound and *touch* the tongue of the face bow (Fig. 12). The heels of the face bow are then brought up until they come to the marks on the side of the face (Fig. 13). The face bow is then resting in a plane parallel to the eye-ear plane which necessarily means that the base of the compound is also parallel to the eye-ear plane.

After a slight chilling the face bow and compound are removed and the compound is thoroughly chilled. It is then removed from the face bow and put with the plaster record impressions to be used in the model-former when the model is made.

The anatomic portions of the model having been made, the piece of compound is now placed on the teeth of the maxillary model and the maxillary model base formed the same as has been previously described in the model-forming technic, except that instead of the sliding plane pushing directly on



Fig. 11.

Fig. 12.

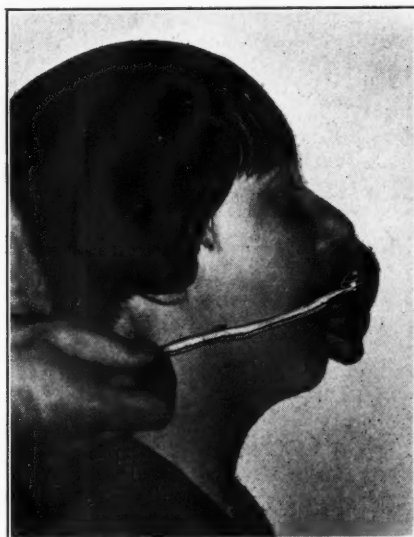


Fig. 13.

the teeth, it now must push on the base of the compound as shown in Fig. 14. The upper art portion may need to be made thicker than one-third of the anatomic portion as the palate will now slope up in the back. This will make the base of the upper model parallel to the eye-ear plane and consequently

the teeth will be related to the upper base of the model as they are to the eye-ear plane in the head. The lower base is then made as previously described with the teeth in occlusion causing the upper and lower bases to be parallel (Fig. 15). The plane of occlusion in the model is then exactly in the same relation to the base as it is in the head related to the eye-ear plane and a very valuable record and study cast is made.

If it is desirable to know the amount of growth from the eye-ear plane to the occlusal plane as is shown in the Simon models, this measurement which has been taken with the dividers in Fig. 9 is recorded on the back of the model as follows: VG— $54\frac{1}{2}$ mm., meaning vertical growth $54\frac{1}{2}$ millimeters from the eye-ear plane to the incisal edge of the upper incisors (Fig. 16).

Some may prefer to have the base of the maxillary model start a definite distance from the eye-ear plane in order to be able to compare models

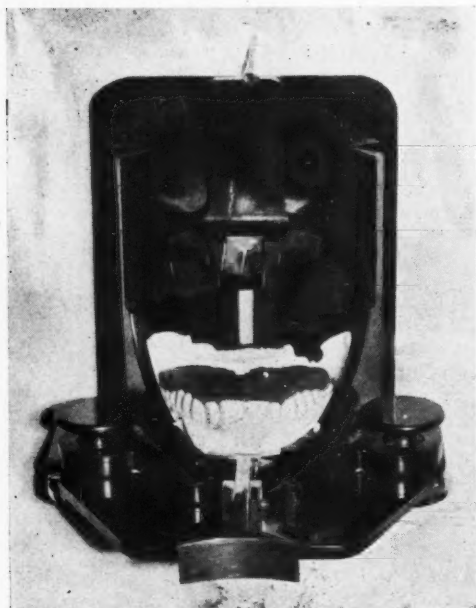


Fig. 14.

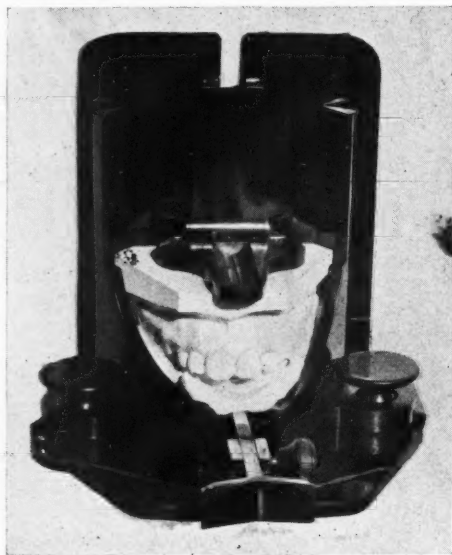


Fig. 15.

without referring to the vertical growth measurement. In this case a definite number of millimeters may be subtracted from the vertical growth measurement. For example: If we decided to make all models start 20 mm. below the eye-ear plane and the vertical growth in the first case were $54\frac{1}{2}$ mm., then the upper model from the incisal edge of the upper incisors to the base must be $34\frac{1}{2}$ mm. In the model the sliding plane stop is then set at $34\frac{1}{2}$ mm. and the upper anatomic portion is pushed down with the compound bite.

This later suggestion is, of course, arbitrary. We prefer to look at the VG measurement as recorded rather than sacrifice the artistic beauty of the model as we feel the end-result is the same and to me vertical growth recorded in millimeters is more impressive than visual study of casts recording this.

For those desiring to locate the orbital plane in its bisection of the teeth, attachments are made for the face bow which extend at right angles to the

orbital points. With these attachments a line is made on the compound which lies in the orbital plane. This line will then show exactly where the orbital plane bisects the maxillary teeth. A full description of this is not given here as it was not fully demonstrated in the clinic.

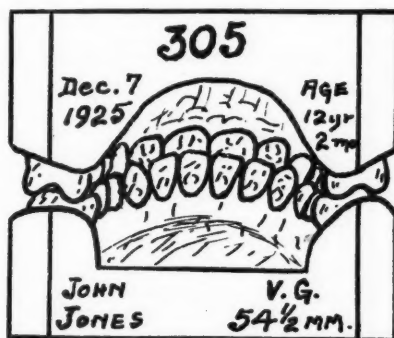


Fig. 16.

It must be remembered that the eye-ear plane is only an arbitrary plane determined by digital examination and will consequently vary in different hands to some degree. Thus while accuracy is spoken of in locating the plane of occlusion in its relation to the eye-ear plane, it must necessarily be considered only as nearly accurate as is possible to get by any means where digital determinations are depended upon.

TREATED CASES AND APPLIANCES USED*

BY HUBERT T. GOSNEY, D.D.S., DANVILLE, VA.

CASE 1.—Fig. 1 shows the models of a patient ten years of age, before and after treatment. This is a neutroclusion case with unilateral linguo-version of the maxillary teeth on the left side with extremely narrow arches. The mother states that the child slept with the left side of his face on the pillow and was often seen with the hand under this side of the face. There is a lack of development in the maxillary region and also in the nares on this side. This patient was a mouth-breather when treatment was started. Figs. 1 and 2 show the position of the teeth before treatment was started.

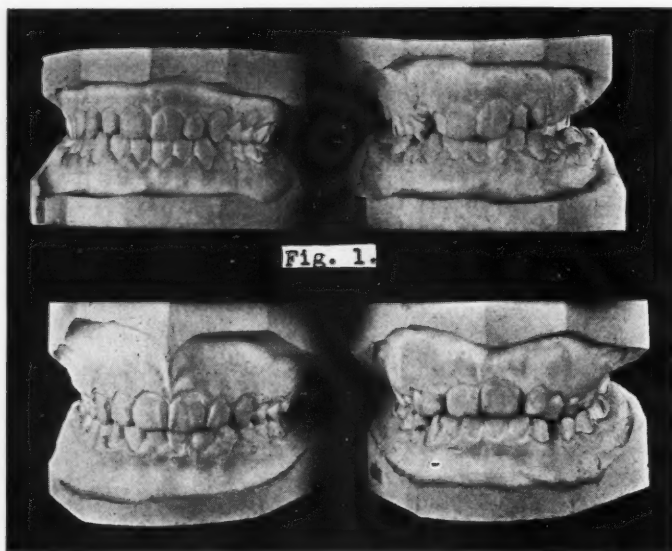


Fig. 2.

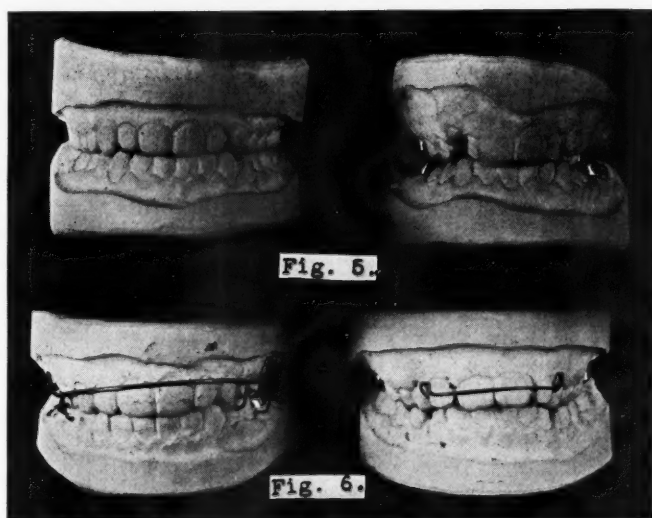
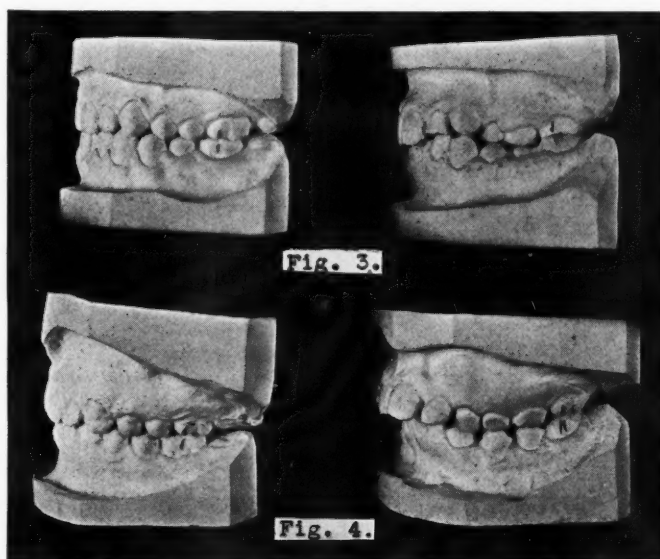
Bands were made for the maxillary and mandibular first molars, half-round tubes were attached to bands and removable lingual appliances were made as shown in Fig. 9. Recurve finger springs made of 0.020 wire were used for expansion. A spur was soldered on the lingual surface of the left maxillary molar bands just under the body wire and next to the half-round tube.

A rubber ligature was worn from this spur, across the bite, to the spur soldered on the buccal surface of the band on left mandibular molar. The body wire was sprung slightly and the rubber ligature worn across the bite moved the maxillary left molar into position, bodily. The temporary molar and premolar were moved over with the auxiliary spring. Expansion was

*Clinic presented before the Twenty-sixth Annual Meeting of The American Society of Orthodontists, Chicago, May 2-5, 1927.

obtained in both arches at the same time the maxillary left molar was moved over into position.

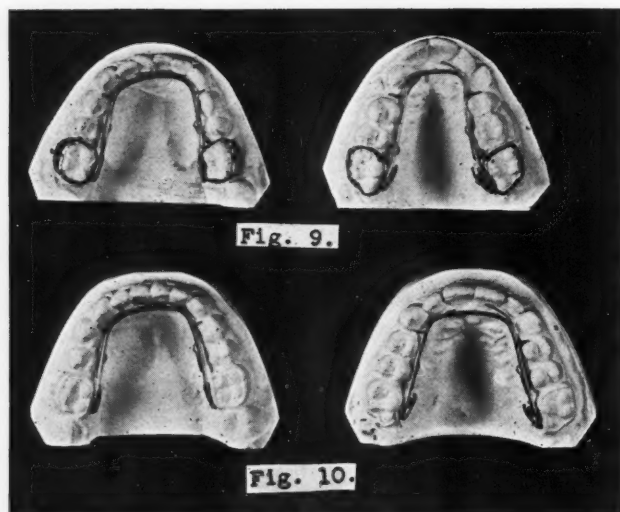
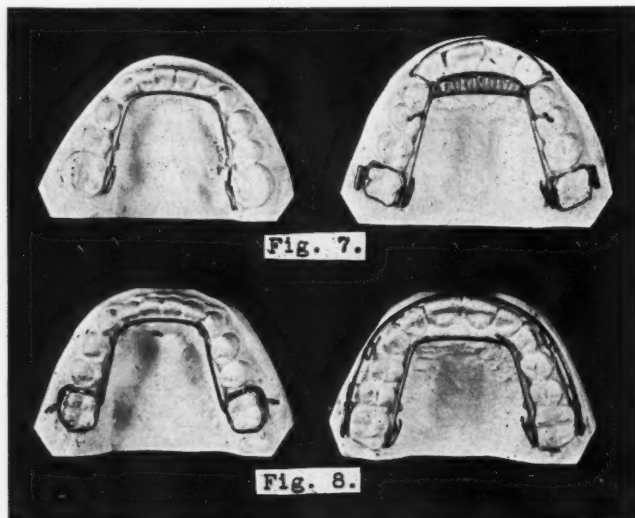
After the maxillary teeth on the left side were moved to position, new lingual appliances were constructed with auxiliary springs as shown in Fig. 10. The case was completed with these appliances by continued expansion.



This case was under treatment about twenty-one months and was treated throughout with lingual appliances.

CASE 2.—Figs. 2 and 4 show the models of a patient eleven years of age, before and after treatment. The mandibular arch has a distal relation to the maxillary arch with a protrusion of the maxillary incisors. The mandibular incisors are elongated and biting into the soft tissues. This patient sucked his thumb in early life, and afterwards developed a lip habit. Bands were made for the first molars and appliances were constructed as shown in Figs. 6

and 7. The lingual appliance of the maxillary arch as shown in Fig. 7 was constructed with a bite plane so that the mandibular incisors would strike it, depressing these teeth and at the same time releasing the pressure on the mandibular molars and premolars, allowing them to elongate. Occlusal rests were soldered to the body wire and made to rest in the occlusal surface of the temporary molars to prevent the appliance from causing too much pressure on the



soft tissues. The body wire was constructed so that it rested just against the cingulum of the four maxillary incisors. A 0.025 wire was soldered to the body wire, passed through the space between the temporary canine and permanent lateral, carried up to make a loop and adjusted to the labial surfaces of the incisors just above the incisal edge as shown in Fig. 6. By the adjustment of this wire with the contact of the body wire on the lingual we get a bodily movement of these four teeth, straightening them up at the same time we depress the mandibular incisors.

With a lingual appliance on the mandibular arch with short auxiliary springs, we get a slight expansion which was sufficient for the mandibular arch.

After correcting the supraclusion of the mandibular anteriors and the protrusion of the maxillary incisors, new appliances were constructed as shown in Figs. 8 and 6. A soldered lingual arch was constructed for the mandibular with spurs on molar bands. A removable lingual arch was constructed for the maxillary arch in connection with a labial arch with intermaxillary hooks. Intermaxillary ligatures were worn for a short time connecting the anteroposterior relation in a few months. This case was under treatment approximately two years. A few months after treatment was complete, the appliances were removed and the patient wore a Hawley retainer for several months. All appliances have been out of the mouth for over a year and I see no signs of relapse.

SOLVING THE PROBLEM OF THE IMPACTED CANINES*

BY ALBERT W. CROSBY, NEW HAVEN, CONN.

THE first thing to consider, of course, is the location of the tooth, both by digital examination and radiograms. One of the most satisfactory ways of locating a canine crown in relation to the roots of other teeth is to take a No. 2 film, place it in a horizontal position in the mouth, and while the patient holds it with his teeth, make an exposure with the rays coming from above. More than one picture should be taken to locate the tooth, and from more than one angle. Stereoscopic pictures are sometimes invaluable.

After the tooth is definitely located, an incision should be made three times the length of the crown of the tooth following the curve of the arch, and not along the middle of the long axis of the crown of the tooth but along the margin of the crown that is on the side toward the teeth. This will give a clearer vision of the field because the tissues will not bunch up as much on the palatine surface in the direction of the median suture as when piled up with the teeth acting as a dam. The periosteum is dissected back, and sufficient area of bone is freed to adequately expose the area around the crown of the tooth. It is taken for granted that suitable anesthesia, asepsis, etc., have been obtained.

The bone over the tooth is cut out with a gouged-shaped chisel and mallet until most of the crown of the tooth is exposed, then the operation is completed by hand pressure with oblique-edged chisels and long thin hoe-shaped excavators. The latter instruments are especially useful in getting out the thin septum of bone between the canine crown and central or lateral root.

When a sufficient amount of the crown has been exposed, an impression is taken. A copper band is selected, taking the opposite canine as a guide for

*Clinic presented before the Twenty-sixth Annual Meeting of The American Society of Orthodontists, Chicago, May 2-5, 1927.

size. Trim to suit conditions. Warm modelling compound is then placed in the band and pressed well into place. Be sure you have reached the space where the septum of bone has been removed from between the canine and the tooth it approximates. An amalgam die is made and the regular routine is carried out for casting a gold-shelled crown, using the thin inlay wax 30 gauge because it is desirable to have the gold as thin as practicable, otherwise there will be too much space required to get the canine into the line of the arch. If the cast cap does not go down all the way on the amalgam die, put it in your swedger with a little moldine. A tap or two will settle it down into place.

As soon as the impression has been taken, carefully irrigate with warm Dakin's solution. Temporary stopping is forced in to hold the tissues back, and this is introduced under the border of the periosteum which will hold it well in place and keep the tissues free from the area about the tooth until we cement the cap. Be sure stopping is packed tightly into the space between the canine and the root of tooth it so nearly touches. A little space gained by this wedging will facilitate placing the cap when you are ready to cement it. At least a week, and better, ten days or even more, should elapse before the cap is cemented. The tissues will then have recovered from all soreness incident to the operation, and there will be practically no seepage.

Hooks or lugs are placed at points of vantage on the cap so the tooth may be drawn out into line and rotated if necessary. The remainder of the procedure is simply routine orthodontia.

The making of pits to cement pins into canines, to my mind, is malpractice or little short of malpractice.

Exodontists make a great flare and give elaborate technics for extracting these impacted teeth which, with a good technic, can be brought down just as well as not. Such important teeth as the canines should not be sacrificed.

DEPARTMENT OF ORAL SURGERY, ORAL PATHOLOGY AND SURGICAL ORTHODONTIA

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THE CLINICAL SIGNIFICANCE OF TOOTHACHE (ODONTALGIA) IN THE ABSENCE OF DENTAL PATHOLOGY

BY FRENCH K. HANSEL, M.D., M.S., ST. LOUIS, MO.

(From the Department of Otolaryngology, Washington University Medical School)

IN THE entire symptomatology of dental diseases, toothache is the most common and most important complaint for which the patient seeks relief. When this symptom is present, there is, as a rule, some definite pathology to account for it. Certain cases are not infrequently encountered, however, in which toothache may be present in one or several teeth with absolutely no dental pathology to account for the pain. It is this group of cases to which the following discussion will be directed.

When this type of case is encountered by the dentist, he may be very much perplexed as to what type of therapy is to be employed to relieve the patient. The pain may be so severe and excruciating that the patient demands immediate relief. He may believe that the teeth are at fault and he is apt to insist upon the removal of certain teeth. In the management of these cases, the dentist should after proper investigation, refer the patient to a physician who is competent to carry out the necessary investigation to locate, if possible, the probable etiologic factor.

Before considering the subject of toothache and pain in the jaws in the absence of dental pathology, it may be well to discuss briefly the subject of true dental neuralgia. Dental neuralgia due to caries of a tooth producing inflammation of the pulp cavity, or acute pulpitis, may itself cause tenderness and pain referred only to that tooth, that is to say, neuritis of the dental nerve filament of that tooth. Soon, however, in many cases the pain begins to radiate beyond the affected tooth along the mandible or maxilla as the case may be, or indeed the pain may be referred to the maxilla only, when the offending tooth is in the mandible and vice versa. It should be noted, however, that dental neuralgia is never reflected across the middle line.

Dental neuralgia may affect areas beyond the maxilla or mandible and

sometimes the pain will spread over the whole area of distribution of the trigeminal nerve and extend down the neck, arm and hand. Such a wide distribution as this, however, is rare. The various teeth have their special area of referred pain, especially the mandibular third molars, disease of which often causes pain referred to the ear and down the side of the neck.

The mandibular third molar is especially likely to give trouble; the tips of its two roots are in close proximity to the inferior dental nerve and may even enclose this nerve between them. Violent neuralgia may be produced in the young adult by an erupting third molar encountering toughened gum over it, but incision of the swollen gum over the tooth will relieve the pain. The common developmental defect in the position of the mandibular molar is due probably to the shortening of the mandible which is taking place in the human race. The last molar tooth thus becomes tilted forward, the roots lying against the base of the coronoid process and the crown of the tooth lying against the second molar in front. In many cases this may cause no damage and may remain in that position throughout life without giving rise to symptoms. In some cases after puberty, severe pain may be caused by the pressure of the third molar forward against the second molar, and the occurrence of severe neuralgia referred along the mandible and into the ear in a young adult should always lead to careful examination of the teeth. If the third molar has never erupted, x-rays should be taken, and if the tooth is impacted, as described above, it is advisable to remove it.

In the investigation of facial neuralgia, it is very important to examine the teeth carefully as dental causes are the most common origin of facial pain. The teeth should be carefully examined and x-rayed and a mirror should be employed to inspect the posterior surfaces. The teeth should be tapped, tested with an electric current, and syringed with hot and cold water. Severe and intractable neuralgia may be caused by the lodging of a bristle of a tooth brush in a tiny hole leading into the pulp cavity of a molar tooth. Probably the most common cause of dental neuralgia is caries of a tooth, the cavity being irritated by sweet and decomposing food.

Lesions involving any part of the trigeminal nerve, from the brain stem to the terminal endings, may give rise to pain which manifests itself as toothache. Lesions of other cranial nerves which are connected by anastomotic branches to the trigeminal nerve may produce reflex pain in the teeth, jaws, and face. For convenience of study, the various lesions involving the trigeminal system will be considered according to their location, starting near the terminal endings and progressing backward to the origin of the nerve in the brain.

The most common cause of pain in sound teeth is an acute or chronic infection of the maxillary antrum. The pain is more frequent with acute infections or an acute exacerbation of a chronic infection than with true chronic infection. The pains are the result of irritation of the nerves of all the teeth of the superior maxilla, a type of neuralgia of the superior dental nerves. The toothache, however, is not always intensive; at times the patient has only a dull feeling in the maxillary teeth; at times it seems as if individual teeth

were elongated. In cases of empyema of the antrum following influenza, neuralgias of considerable severity may involve both the infraorbital and superior dental nerves.

It is very probable that such pains are pressure manifestations following stasis of the secretion and a high grade swelling of the mucous membrane of the maxillary antrum. These severe pains are usually alleviated by antrum puncture and irrigation. The pain always ceases completely after several days.

Tumors of the maxillary antrum, particularly carcinoma, may produce pain in the teeth and maxilla. Carcinoma may involve the dental nerves by direct extension. The toothache is usually constant and severe, and may be the only symptom present in early malignancy of the antrum. Carcinoma of the tonsillar region may also cause toothache by involvement of the mandibular nerve. Reflex pains in the maxilla and maxillary teeth may be caused by an impacted third molar in the mandible and vice versa.

Pain in the teeth and jaws may occur as a part of nasal or sphenopalatine ganglion neuralgia, as described by Sluder.¹ In this syndrome, the pain usually begins at the root of the nose, in and about the eye, the maxilla and maxillary teeth, sometimes also the mandible and mandibular teeth, and extends backward to the temple and about the zygoma and ear. It also extends to the mastoid region, neck, shoulder, arm and fingers. This is the most frequent picture, but at times there may be also a sense of stiffness or aching in the throat, pain in the hard palate or in the nasal cavity. The teeth may feel elongated and there may be a perverse (metallic) sense of taste. The pain in this syndrome can usually be stopped by cocainization of the nasal ganglion. This pain syndrome may be produced by infection in the sphenoid sinus and posterior ethmoid cells. In this instance the inflammatory process causes an irritation of the nasal ganglion. On account of the proximity of the sphenoid sinus and the posterior ethmoid cells to the branches of the trigeminal nerve, pain may be produced in the teeth and jaws from inflammatory irritation of the nerves.

In cases of malignant tumors of the nasopharynx, pain in the face and toothache are common and early symptoms. The tumor is usually located just posterior to the orifice of the eustachian tube and extends from there into the sphenomaxillary fossa where the second and third divisions of the trigeminal nerve are involved. The pain is usually constant, severe and excruciating, lasting day and night. These pains may be the only symptom in the early stage of the disease. On account of the severity of the toothache many teeth are, as a rule, sacrificed but fail to relieve the patient.

About two years ago a patient, male, aged fifty-three years, came under my observation with a history of having suffered for fourteen months with double vision, pain in the left eye and forehead, and toothache in the premolars and molars of the left maxilla. These teeth were extracted and a nose operation was performed without relief of pain. Later, he developed numbness in the face over the second and third divisions of the trigeminal nerve. Upon examination of the nasopharynx a carcinoma was found on the lateral wall. The patient was treated with radium, but finally died. I have

observed a number of these patients who suffered with severe toothache and who sacrificed many teeth without relief of pain.

Ankylosis of the jaw may occur from involvement of the pterygoid muscles. In these cases, the third molars are usually considered at fault. Nasopharyngeal tumors are not uncommon and should be considered as an etiologic factor in cases in which the pain in the face and jaws is unusually severe and constant and in which other cranial nerves are affected.

Intracranial tumors or other lesions involving the gasserian ganglion may give rise to pain and sensory disturbances over the distribution of the trigeminal nerve identical with those produced by malignant tumors of the nasopharynx. Pain is usually the initial symptom and the one for which relief is sought. The pain may vary in its intensity and constancy. It may be referred to the eyes, cheek, tongue, and teeth. Sudden paroxysms of pain are unusual and they are not influenced by eating, talking, and chewing as in trigeminal neuralgia. Changes in pain perception such as numbness or hypersensitiveness, and loss of temperature appreciation may be present.

Although pain may be the most prominent symptom in these cases, there are apt to be other symptoms and signs on which to base a definite diagnosis. The following case reported by Shelden² illustrates these points. A woman, aged forty-five years, gave a history of having had steady, severe pain in the left cheek for a period of eighteen months. All the teeth had been removed and an operation performed upon the left antrum without relief of pain. The last two months a hoarseness and some difficulty in swallowing had developed. For a considerable period she had had epileptiform attacks at intervals of two weeks. Several alcohol injections had been made without relief, although the numbness in the face was considerably increased by them.

Examination showed a complete paralysis of the left external rectus and also slight ptosis. The left pupil was slightly smaller than the right. The left masseter and temporal muscles were greatly weakened and the jaw deviated to the left. There were changes in the tactile sensibility over the face; pain and temperature sensibility was lost over the chin and cheek. The soft palate, pharynx and vocal cord were paralyzed on the left side. The tongue, trapezius and sternomastoid muscles also were paralyzed. Neurologic signs were present elsewhere. At operation, a tumor was found involving the gasserian ganglion. The fifth nerve was cut and temporary relief of pain was obtained. The patient finally died.

Tumors located in the cerebellum or posterior fossa of the cranial cavity may, by pressure or irritation of the trigeminal nerve at the brain stem, produce pain in the face, teeth and jaws. The following case of cerebello-pontine angle tumor reported by Weisenburg³ illustrates the difficulties sometimes encountered in making a diagnosis and the number of operations and other procedures instituted to relieve the patient.

A man, aged thirty-five years, began to have pain in the right upper teeth for which he consulted a dentist. A tooth was extracted but the pain continued and in a short time every tooth in the right maxilla was removed. The patient then complained of pain in the right maxilla, nose, eye and

forehead. He was admitted to a hospital where five peripheral operations were performed at the infraorbital foramen but without beneficial results. The pain would come on like a wave of hot water in the eye and teeth. The pain came on every four or five minutes; sometimes every hour at his best periods. Touching the maxilla would bring on an attack of pain.

Later the patient developed a paralysis of some of the muscles of the right eye. Many operations were performed on the infraorbital nerve and finally four years after the onset of symptoms an operation was performed on the gasserian ganglion. The pain disappeared for a few days but returned. Some teeth were removed from the mandible. Later, pain began to occur in the throat and tongue, radiating to the ear. In the mouth and throat there was a sensation as if "roaches were crawling over the parts." Finally after many years of suffering the patient died and at autopsy a tumor was found at the right cerebello-pontine angle lying directly on the sensory and motor roots of the trigeminal nerve. The ninth and tenth nerves were very prominent, stretched over the lower portion of the tumor.

By virtue of the fact that the middle ear, the mastoid, and the auditory canal are connected with the trigeminal nerve through the nasal ganglion, the otic ganglion, and the auriculotemporal, reflex disturbances arising in these regions may cause pain over the trigeminal system, especially in the teeth, jaws, and face. These pains are not uncommon during an attack of acute otitis media. Spasm of the muscles of mastication may also occur. The occurrence of these reflex disturbances in chronic infection of the middle ear and mastoid is rare.

The following case reported by Uffenorde,⁴ although unusual, most strikingly illustrates the connection of the ear with the trigeminal nerve.

A patient, aged thirty-seven years, who had chronic otitis media was examined on account of earache which had been present for eight days. Severe pain was also present in both jaws. The patient consulted a dentist in regard to the teeth. He opened one tooth and extracted another without relief of pain. Peroxide was instilled into the ear and a paroxysm of pain was excited in the face and jaws. The patient grasped the face in agony. The patient also complained of pulsations in the ear and at times a tingling sensation in the jaws. The teeth seemed elongated and thick. There was also a spasm of the jaw so severe that the patient could not eat.

The general and neurologic examinations were negative. The right ear showed a foul discharge of pus and the presence of granulation tissue. A radical mastoid operation was performed which disclosed the presence of infection in the mastoid and middle ear. The latter contained two cotton tampons which were causing pressure. For a few days after the operation, attacks of spasm of the jaw muscles and pain in the teeth and jaws appeared. The attacks of pain could be reproduced by the instillation of resorcin-alcohol into the ear. Finally all pain and spasms disappeared.

A similar case came under my observation about a year ago. The patient, a man, aged twenty-six years, complained of attacks of pain in the left side of the face, teeth, and jaws which had been present for four weeks.

He had a chronic discharge from the ear which had been present for six months. The x-ray showed a chronic infection in the mastoid, so a mastoid operation was performed. Upon removal of a pack of gauze from the mastoid wound several days after the operation, an attack of pain in the face and jaw was reproduced. Subsequently the pain entirely disappeared.

The following case reported by Allen⁵ is also very interesting. A man, aged twenty-one years, complained of having had pain in the left maxilla and maxillary for a period of three months. He had three teeth removed without relief of pain. The pain was extremely severe and came on at various times of the day, lasting often as long as ten minutes.

The patient also complained of ringing in the left ear. The examination of the ear disclosed the presence of a hair, about three-eighths of an inch in length, lying in the ear canal with one end in contact with the ear drum. The removal of the hair produced immediate and permanent relief of pain.

Paroxysmal trigeminal neuralgia at its onset is difficult if not impossible to distinguish from dental neuralgia, especially when its beginnings are gradual and not violently spasmodic. It is only by the exclusion of dental and other causes, and by the long continuance of the painful attacks and their resistance to ordinary treatment that the diagnosis of the inveterate neuralgia may become established. In a large number of cases the first onset of the pain is not gradual but sudden and violent.

When trigeminal neuralgia becomes definitely established and the pain occurs in paroxysms, there can be no question about the diagnosis. The pain usually comes on suddenly, lasts a few moments or minutes, then ceases. The pain is most intense and excruciating. It is brought on by eating, talking, chewing, washing the face or anything producing a sensory impulse. There may be long periods of freedom from pain. There is no other pain syndrome about the face as classical as trigeminal neuralgia. Patients suffering with this disease always consult the dentist, believing that the teeth are at fault. In a large percentage of cases many teeth are sacrificed to relieve the pain, but extraction never produces results. It behooves the dentist to be familiar with this syndrome and to direct the patient to the neurologic surgeon for proper treatment.

Reflex pains in the teeth and face often occur as an accompaniment of the migraine type of headache. By virtue of the fact that the meninges of the anterior and middle fossae of the brain are supplied by sensory nerves from the three branches of the trigeminal, any irritation of these structures may produce reflex pains in the teeth and face. I have frequently observed patients with headache in whom these reflex pains were present. In many of the cases the facial pain as well as the headache was stopped by cocainization of the nasal ganglion.

In addition to the group of cases in which pains in the teeth and face are caused by some definite pathologic condition, there is another large group of cases with pains, aches, paresthesias, and disagreeable sensations for which no explanation has been discovered. It is very difficult to relieve these patients by any known procedure. They submit themselves to all sorts of

treatment only to find the symptoms more marked. They have teeth removed, the jaws curetted and the branches of the trigeminal nerve injected with alcohol, without relief. This is the type of case with which the dentist should proceed most carefully, as these patients are apt to cause him much anxiety and disappointment.

A most comprehensive and interesting article published by Parker⁶ on the subject of the clinical significance of pain in the area supplied by the fifth cranial nerve, reveals the difficulties sometimes encountered in the management of those cases with indefinite pain in which no cause can be discovered. He discusses the subject from the standpoint of neurology. The cases reported in his group were previously examined by the internist, dentist, ophthalmologist, and rhinologist without discovery of the cause of the pain.

DISCUSSION

In summarizing the foregoing discussion on the clinical significance of toothache in the absence of dental pathology, it is apparent that many causative factors are to be taken into consideration. In the majority of the cases of this type, the etiologic factor will be found in the nose, for toothache commonly accompanies diseases of the maxillary antrum. If the teeth are carefully inspected and x-rayed, and no dental pathology is present, the patient should be referred to the rhinologist for examination. In the event that the nose is not at fault, the rhinologist should exercise his judgment in directing the patient for further examination. The close cooperation of dentist and rhinologist will produce the most satisfactory results and the subjection of the patient to unnecessary procedures will be avoided.

REFERENECS

- ¹Sluder, Greenfield: *Nasal Neurology, Headaches and Eye Disorders*, C. V. Mosby Co., 1927.
- ²Shelden, W. D.: Tumors Involving the Gasserian Ganglion, *Jour. Am. Med. Assn.*, 1921, lxxvii, 700.
- ³Weisenburg, T. H.: Cerebello-Pontine Angle Tumor, Diagnosed for Six Years as Tic Douloureux. The Symptoms of Irritation of the Ninth and Twelfth Cranial Nerves, *Jour. Am. Med. Assn.*, 1910, liv, 1600.
- ⁴Uffenorde, W.: The Ear and the Trifacial Nerve, *München. med. Wehnschr.*, 1926, lxxiii, 2064-2066.
- ⁵Allen, A. P.: Facial Neuralgia Due to a Hair Irritating the Membrana Tympani, *Brit. Med. Jour.*, 1901, i, 395.
- ⁶Parker, H. L.: The Clinical Significance of Pain in the Area Supplied by the Fifth Cranial Nerve, *Minnesota Medicine*, February, 1924, p. 69.

CASE REPORT

BY DR. ERNEST A. MORRIS, HOUSTON, TEXAS

FEMALE, aged sixty years, with x-ray of an impacted unerupted mandibular left second molar, presented herself. (For x-ray see Fig. 1.) The tooth occupied almost the entire body of the mandible and the apex of the tooth was even with the inferior border of the mandible. Had there not been a slight "bulge" of the inferior border, the apex would have been through the bone.



Fig. 1.

The patient had worn a plate for eight years; typical old age mandible. The occlusal surface of the tooth was exposed about one-half of its surface; the gums over it were resorbed from pressure and infection. Considerable local pain and neuralgia symptoms were experienced. It was imperative to remove the tooth.

The two main issues were the possibilities of fracture and injury to the inferior dental nerve. As case presented with almost a pathologic fracture,

we took the precaution to take an impression and have a model ready for a splint if needed.

The tooth was removed surgically with no pressure and with no chisel blows, and fortunately the mandible was not fractured. The nerve and mandibular artery were torn asunder, and it was found that they passed through the tooth itself; not through fused roots but a perfect continuation of the mandibular canal through the body of the tooth. (See Fig. 2.)



Fig. 2.

There was entire absence of any unusual hemorrhage or pain, due to atrophic condition of the blood vessels, etc. It will be remembered that case was edentulous, patient having worn a plate for a number of years. There was anesthesia of the lip supplied by this nerve, from the mental foramen to the median line. Recovery was uneventful.

LIPOMA OF TONGUE

BY DR. CHARLES S. WHITE, WASHINGTON, D. C.

THE infrequency of benign lesions of the tongue prompts me to report this case:

J. A., fifty-five years old, a farmer by occupation, consulted me November 14, 1927, for a growth on the tongue. He had always enjoyed good health, suffered with dyspepsia occasionally, and had no local or constitutional disease that had any apparent relation to his complaint.

He exhibited a globular, yellowish mass, about 3 cm. in diameter, attached to the under surface of the anterior portion of the tongue and moved freely with the tongue. It did not interfere with his speech, or digestion. In fact, it was not even a source of discomfort. He was aware of its presence for eight years; its growth had been very slow. When the tongue was protruded, the tumor could readily be seen. It was firm, insensitive, and glistened like fat through a thin layer of mucous membrane. It was thought to

be a lipoma; in fact, no other diagnosis seemed possible, as it looked exactly like a ball of fat.

Four days later I removed the growth under gas anesthesia, and the pathologist confirmed the diagnosis.



Fig. 1.

I have had the literature searched and found that but fourteen cases have been reported up to 1892. Since 1898 five additional cases were cited.

Lipomas are the most infrequent growths of the tongue. They are sometimes multiple or polypoid; are a source of very little inconvenience, considering their size, and the only treatment, surgical removal, is simple and satisfactory.

CARBON DIOXIDE IN GENERAL ANESTHESIA

BY ROBERT FRIEDMAN, D.D.S., BRONX, NEW YORK

INTRODUCTORY STATEMENTS

SINCE the epochal days of Wells, Morton, Jackson and Simpson, there has been practically no advance made in the discovery or in the improvement of the accepted methods of administrations until Luckhardt discovered ethylene and Henderson developed the use of carbon dioxide.

It is quite true that both of the latter agents were known before Luckhardt and Henderson proclaimed them, but in the case of ethylene, it was forgotten almost immediately after Thomas Nunnely discovered it, and carbon dioxide was also discovered as being a poor and dangerous gas with which to induce a general narcosis. It has not increased in value as an anesthetic agent, but as a stimulant and as an agent to control respiration it has increased in value until now it has no peer!

Ethylene has been discussed in previous papers and it will be elaborated upon in a future one; our present intention is to confine this paper to the advent, use, and future application of carbon dioxide in general anesthesia.

PHYSIOLOGIC SIGNIFICANCE OF CARBON DIOXIDE

Any one who so desires may suspend at will the act of respiration. This suspension can continue only for a short time when the respiratory cycle must again assert itself. By self-experimentation any individual will find that the suspension of respiration must be followed within a relatively short period of time by an exhalation of the retained vital air and an inspiration of atmospheric air, thereby ventilating the lungs. The necessity for this arises by reason of an increased tension of carbon dioxide, which acts as a physiologic respiratory stimulant and regulator. The retention of the vital air in the lungs produces a condition of hypercapnia in the blood and when the carbon dioxide tension is increased to 10 per cent, the respiratory center in the medulla is so irritated that breathing must be reestablished. If, on the other hand there is a marked increase in the expulsion of carbon dioxide from the body generally, due to very rapid breathing induced by shock, a condition of acapnia is produced.

Henderson says that "carbon dioxide is produced in the body by the same process by which oxygen is consumed." The supply of oxygen has relatively little immediate influence upon respiration. The administration of pure oxygen gas never acted as a stimulant. Carbon dioxide on the contrary is the normal stimulant and regulator of breathing. The amount, or more exactly the pressure of carbon dioxide in the air in the lungs, and thus into the arterial blood flowing from the lungs, acts upon the respiratory center so precisely that in normal life the volume of air breathed in is kept in almost

the exact proportion to the amount of carbon dioxide produced in the body. Even during the 10 per cent variation of carbon dioxide production during bodily rest and in vigorous muscular work, the activity of the respiration to the amount of gaseous stimuli is maintained. In other words, the lungs are automatically ventilated, so that the air which they contain has under all normal conditions a content of little more than 5 per cent of carbon dioxide. This concentration of carbon dioxide is one of the main functions in the acid-base balance of the blood, and tissues. It is itself a chief acid in this balance and it controls indirectly but effectively, the amount of alkali in the use of the blood.

Carbon dioxide is produced by the metabolic activities of the body. It was thought that all of the special tissues of the body except nerve tissues aided in producing it. However, by very delicate tests, Tashiro has reported that he was able to detect a one millionth gram of carbon dioxide in nerve tissues. He also shows that when the nerve is stimulated it produces more carbon dioxide, and that the same nerve can itself be further stimulated by carbon dioxide. These tests show the important side of carbon dioxide both as a by-product of metabolism and as a nerve stimulant. (*Jour. Am. Med. Assn.*, January 22, 1927.)

Goldstein and DuBois, investigating the effects of carbon dioxide on circulation in man, state that an increase in systolic blood pressure occurred in three definite stages and that the duration of each stage could be regulated by changes in the carbon dioxide concentration of the rebreathing mixture. The systolic pressure, the diastolic pressure, and the heart rate showed a characteristic relationship to the changes in the alveolar carbon dioxide tension. It took only one minute for the return to normal recovery upon cessation of the breathing of carbon dioxide.

By administering 5 per cent of carbon dioxide with the inspired air, the respiratory rate can be doubled. It has also been found that it is impossible for the subject to inhibit breathing at will. When such a mixture is given, these two facts are of practical significance when applied to general anesthesia.

SPECIAL USES OF CARBON DIOXIDE IN GENERAL ANESTHESIA

Every anesthetist wants to accomplish three things when administering a general anesthetic. It is his desire to reduce the anesthesia quickly and smoothly; to maintain it so as to keep the subject well under control; and finally to have an uneventful return from the anesthesia, with a maximum expulsion of the drug or drugs used to accomplish the narcosis. These three functions can be accomplished very readily when carbon dioxide is used with the anesthetic.

Before the anesthetic gas is turned on, the patient is given a mixture of oxygen and carbon dioxide. This mixture will ventilate the lungs and start immediately unceasing breathing. This initial step is followed by the administration of the anesthetic with this mixture. The combination of the three gases will leave the effect of stimulating respiration with the carbon dioxide supporting life with the oxygen and inducing the anesthesia with the anes-

thetic. If a fourth gas, such as ethylene is used, this can be given in sequence and the anesthesia progresses smoothly and successfully. The constant and rapid breathing induces the anesthesia more quickly and maintains it with a lesser amount of the anesthetic gas. When the operation is completed the anesthetics are discontinued, while the oxygen-carbon-dioxide mixture is continued until the subject has returned to consciousness. If this is done, a speedy and uneventful return to consciousness is the general result.

Our experience has led me to believe that the best and safest mixture to use is oxygen 95 per cent, carbon dioxide 5 per cent. When this mixture is administered and rebreathing is induced, the subject is inhaling approximately 10 per cent of carbon dioxide which is the maximum amount that can be given with safety. This is the result of observations in many hundreds of anesthetics in which I have tried mixtures containing greater percentages of carbon dioxide. These mixtures containing a greater amount of carbon dioxide overstimulate breathing, thereby producing a greater intake of the anesthetics. Such a condition tends to oversaturate the patient and to produce too deep an anesthesia. It generally produces this depth with a rapidity that is quite undetectable until it occurs. This does not happen when the 5 per cent mixture is used. In an emergency, when it is desirable to stimulate respiration, the 10 per cent mixture is advantageous. It is, however, the better policy to discontinue its use after the emergency is over and return to the 5 per cent mixture. An important consideration in the anesthesia cycle is the return period. Dr. Righetti concludes as follows regarding the advantages of carbon dioxide in her experience as an anesthetist:

1. De-etherization with carbon dioxide is simple and effective.
2. It is probably an important agent in preventing postoperative pneumonia.
3. An emergency tank of carbon dioxide in an operating room is of more value than the usual oxygen emergency tank.

Dr. I. S. Lundy comments favorably as a result of his experiences with carbon dioxide as an adjunct to general anesthesia. His conclusions are:

1. Carbon dioxide in moderate concentration assists in producing anesthesia, rendering the anesthetic apparently safer and easier to administer.
2. Carbon dioxide should be used in such concentrations as will produce optional results, and these vary with the individual and the type and stage of the individual and of the operation. Too much carbon dioxide is worse than none and care should be exercised to prevent more than 5 per cent being used.
3. The Results: A series of 1350 cases in the Mayo Clinic is satisfactory enough to warrant further investigation by others in the use of carbon dioxide during the induction and maintenance of and at the termination of ordinary general anesthesia.

SPECIAL EFFECTS ON POSTANESTHETIC COMPLICATIONS

By properly ventilating the lungs upon the cessation of the anesthesia, it is believed that postanesthetic pneumonia can be prevented. It is agreed that the rapid elimination of the anesthetic reduces its irritating effects and also reduces sweating to a minimum.

There have been several deterrents in the use of ethylene for anesthetic purposes; of these, nausea and vomiting have been most prominent, especially for ambulatory patients. The author has found in his series of cases that both nausea and vomiting can be almost entirely eliminated unless the patient presents himself immediately after a meal or with a heavily loaded stomach. In hospitalized cases where preliminary treatment can be instituted no such contingency is possible but in private practice this happens very often. It is possible by continuing the administration of carbon dioxide with oxygen to control the nausea and to eliminate it completely. Nausea is usually due to the retention of the anesthesia in the tissue cells.

By controlling the postanesthetic administration of this mixture the anesthetic can be practically eliminated from the body before the patient is dismissed. Shock is due to an aftermath of anesthesia and it is the firm belief of Henderson that it is due to acapnia, or loss of carbon dioxide from the body. He has induced shock experimentally in animals and has aided them in regaining their previous physiologic stage by administering carbon dioxide. The general run of patients that are apt to suffer from shock are those that have been suffering excruciating pains for a period ranging from twenty-four hours to a week. During this time little or no sleep is obtained and the patient is extremely neuresthenic and markedly debilitated. Such patients are especially subject to suffer shock if they are subject to various forms of cardiac debilities or from other serious organic lesions such as disturbances of the kidneys or the liver. Having had occasion to treat a great number of such patients, the observations have been particularly focused upon the results obtained when using carbon dioxide with anesthetics previous to operations. It is to his complete satisfaction and keen delight to record that every patient to whom this mixture was administered recovered completely without the slightest evidence of shock. Previous experiences have been that about 1 per cent of such cases would suffer from postanesthetic shock and in several such cases death was narrowly avoided. Since carbon dioxide has been employed in a series of about 1000 cases, even though some evidence of shock was anticipated in many of the cases that presented themselves, no evidence of this condition was manifested. This is especially gratifying because ethylene was the main anesthetic employed. Mischer has said: "Over the oxygen supply of blood carbon dioxide has spread its protecting wings." We can only emphasize this by urging that this protection be used whenever an anesthetic is given.

REFERENCES

- Henderson-Yandell: General Anesthesia. Published by the Dental Board of the United Kingdom.
Goldstein, J. D., and DuBois: The Effects on Circulation in Man of Rebreathing Different Concentration of Carbon Dioxide, *Am. Jour. of Physiol.*, August, 1927.
Lundy, J. S.: Balanced Anesthesia. *Minnesota Med.*, July, 1926.
Righetti, Ethel: De-etherization With Carbon Dioxide, *Am. Jour. Surg.*, September, 1925.
Gwathmay, J. T.: Anesthesia (second ed.).
Friedman, Robert: Physiological Consideration of Respiration With Especial Reference to Anesthesia, *Dental Outlook*, January, 1928.

ABSTRACT OF CURRENT LITERATURE

ORTHODONTIA — ORAL SURGERY — SURGICAL ORTHODONTIA
DENTAL RADIOGRAPHY

BY DR. EDWARD PREBLE, New York City

NUTRITION AND PEDIATRICS

BY DR. SAMUEL ADAMS COHEN, New York City

It is the purpose of this JOURNAL to review so far as possible the most important literature as it appears in English and Foreign periodicals and to present it in abstract form. Authors are requested to send abstracts or reprints of their papers to the publishers.

Orthodontia, Oral Surgery and Radiography

Vicious Eruption of Wisdom Teeth. E. Pollosson and M. Dechaume (Lyon).
La Revue de Stomatologie, March, 1928, xxx, 3.

The authors report two cases, the first of which was originally held to be a malignant growth of the left masseter region in a girl of eighteen. She was sent with the diagnosis of periosteal sarcoma of the mandible with secondary implication of the masseter muscle. A hard, fibrotic mass was enucleated but the microscope showed no evidence of malignancy. After the wound had healed there was an apparent recurrence to which radium was applied without any benefit; instead there was a beginning ulceration. Radiography was now employed and there was seen embedded in the mandible an unerupted wisdom tooth while a similar state of affairs was recognized in the maxilla, due to vicious position of the first and second molars. In place of a resection the surgeon cut down on the mandible which was trephined and the atrophic wisdom tooth extirpated. The two molars were also removed from the maxilla. Considering that the operation was done in an infected field and was long and arduous the result was good, save from the cosmetic standpoint, the face being left asymmetrical. The most burdensome symptom of this patient had been trismus. The second patient, a woman of fifty-eight, had also suffered for months with trismus and swelling at the mandibular angle. For twenty years she had been bothered with facial neuralgia. The Roentgen ray again showed an impacted third mandibular molar. There was slight fever and retromaxillary adenopathy. The operation performed was of the same type as in the preceding case and the result was excellent, the neuralgic pains yielding with the other symptoms.

Fatal Phlegmon of Dental Origin. F. Lemaitre and Ch. Ruppe (Paris). *La Revue de Stomatologie*, February, 1928, xxx, 2.

The authors describe briefly two cases of phlegmon, the first of which developed in a man of forty-five after extraction of the second right mandibular bicuspid. Nearly a month elapsed, however, before the appearance of

symptoms and these at first were vague—pain in the contiguous molar with slight induration in the regional lymphnodes which slowly increased in volume. Nothing was to be seen in the mouth and the molar in question looked normal but it was extracted and a little fetid pus escaped from the socket. The glands in the submaxillary and submental regions had continued to swell but there was no suggestion of fluctuation. There was no general reaction. The picture, however, suddenly changed; the opposite side showed participation, and edema developed in the entire cervical region. An incision showed the presence of gangrenous cellulitis and suppuration on both sides. Death in twenty-four hours. The case was a good example of so-called Ludwig's angina. The second case occurred in a man of thirty-one and the starting point was the second right mandibular molar. After extraction the regional lymphnodes began to swell, much as in the first case, with fever and evident toxemia. Puncture was negative. A broad incision was made in the neck where impending gangrenous cellulitis was recognized. The condition spread to the other side and down the thorax and death which was inevitable was hastened by a severe hemorrhage in one of the incisions. Like the first the case was a typical Ludwig's angina.

Nutrition and Pediatrics

Diseases of Faulty Nutrition. Robert McCarrison. *Brit. Med. Jour.*, January 21, 1928, No. 34998.

McCarrison does not believe that human beings can have too many vitamins when they are taken in the form in which nature provides them, in well balanced combinations of unsophisticated food materials. Some individuals appear to require more vitamins than others; some species of animals require more of a particular kind of vitamin than others, and more are needed for optimum well-being than for the prevention of the so-called deficiency disease.

McCarrison further states that deficiency of vitamin A increases the susceptibility of mice to botuline toxin, and also their susceptibility to mercuric chloride. Deficiency of the same vitamin induces in rats an enormously increased susceptibility to morphine and ergotoxin. Stimulants to central nervous system are all more toxic to rats receiving too little vitamin A than well-fed animals.

Deficiency in vitamin B likewise greatly the susceptibility of rats to ergotoxin and to pilocarpine. The author further states that observations of this kind suggest that the ability of the tissue to detoxify certain poisons—both bacterial and others—is reduced by diets deficient in vitamins.

Vitamin A Deficiency in the Guinea Pig. S. B. Wolbach, Percy R. Howe. *Arch. of Path. and Lab. Med.*, February, 1928, v, 2.

After a careful study of vitamin A deficiency diet on twenty-six guinea pigs, Wolbach and Howe state that the only external signs noted were cessation of growth and loss of weight. Lesions of the eye such as are the rule in rats did not occur. Localized edema and epidermal proliferation are two early changes thus far determined.

Other postmortem observations were emaciation and atrophy of salivary glands and the teeth, and the effects of extensive keratinization of the epithelium in the trachea, bronchi, bladder and uterus.

Among other changes were the finding of keratinizing epithelium in the submaxillary glands, the parotid glands and the accessory salivary glands of the tongue and pharynx.

Soy Bean Feeding and Blood Calcium. A. A. Horvath. Japan Med. World, January 15, 1928, viii, 1.

Horvath quotes several American writers including Osborne and Mendel and Daniels, and concludes that soy beans have in addition to a high calcium content the vitamin which plays such an important rôle in the metabolism of calcium.

The writer reporting from the Pekin Union Medical College, Pekin, China, relates of his experiments in rabbits to determine the effect on the blood calcium consisting exclusively of raw soaked yellow soy beans and other soy bean preparations.

Although there were some individual variations in his experiments Horvath found that the raw soaked soy beans produced a distinct rise in the average calcium in blood serum.

The Value of Whole Potato in Human Diet. S. K. Kon and Amelia Klein. Jour. Biochem., 1928, xxii, 1.

From the State School of Hygiene, Warsaw, Poland, these authors describe an experiment in which two adults, a man and a woman, lived over a period of 167 days in nitrogen equilibrium and in good health on a diet in which the nitrogen was practically solely derived from the potato.

Pellagra in Infancy and Childhood in the United States. Charles J. Bloom. South. Med. Jour., February, 1928, xxi, 2.

In an excellent review of pellagra, Bloom hopes to stimulate interest in this disease.

The first description of pellagra is credited to Gaspar Casal, 1679-1759, and was first diagnosed in Spain about 1700. The first authentic case in the U. S. was recorded in 1864 by John T. Gray of Utica, N. Y. Pellagra in the epidemic form in this country was first noted by Dr. George H. Searcy, 1906-7, at an asylum for negroes in Mt. Vernon, Ala. Fifty-seven out of eighty-six cases were fatal. Since then many more cases, both isolated and epidemic foci, have been reported.

In regard to the etiology, as many as twenty-three theories are offered as the causing agent; toxicity of corn, nutrition deficiency, vitamin lack, parasitic, and poor hygiene are the more favored theories.

Pellagra is a general disease occurring in most parts of the world, but it is more common in warmer climates; the cases are more numerous and more severe in May and June.

Approximately 10 per cent of all pellagra cases are under ten years of age with a mortality of 15 per cent. Both sexes seem equally susceptible. In regard to race, the negro, who is apparently immune in Egypt and elsewhere, is affected at times in this country in greater numbers than the white. Jews do not develop the disease.

Indoor life in the United States is more responsible for pellagra than outdoor life, and institutions have proved foci for a large number of cases.

The fact that few of the office staff, medical or nursing staff ever develop this disease brings up an interesting point regarding contagion and immunity.

The symptoms are generally classified under

1. Alimentary.
2. Skin.
3. Nervous.
4. Osseous.

Long before a positive diagnosis is made the tongue is involved. Three types are noted: the first type is a red, smooth and clean tongue; the second is a geographical tongue, and in the third type the fungiform papillae seem pediculated. It is most significant that in pellagra when the tongue is extended there is a tremor.

Where an early diagnosis of pellagra is made the gums are red and bleed readily. In the later stages the gums are extremely pale and retracted.

The symptoms of the gastrointestinal tract are the most constant, persistent distention, flatulence and diarrhea being extremely common in children with pellagra.

In regard to the skin lesions, which are repeated from year to year, three stages are distinguished: (a) hyperemic, (b) desquamative, (c) cracked, although the cracked stage is uncommon in children. The distribution is symmetrical, the back of the hands, of the feet, neck and upper third of the sternum being most frequently affected. The skin manifestation in pellagra often appears as bands on the forehead or in other instances at the dorsum at the lateral part of the nose in the form of a butterfly, with the wings spread out. These expressions, the author states, are pathognomonic of pellagra. In the spring and recurring in the fall, there is prostration, weariness and intense pruritis, concomitant with the desquamation of the skin which lasts from twelve to twenty-five days.

A large percentage of children with pellagra complain of symptoms pertinent to joints and long bones, and sometimes a diagnosis of Still's disease is made.

Dactylitis, which is found in tuberculosis and syphilis, has been observed in three of the 147 cases in children studied by Bloom.

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EDITORIALS

Dr. Howard's Study of Skeletal Growth in Comparison to the Growth of Teeth and Jaws

AT THE last meeting of the American Society of Orthodontists, Dr. Clinton C. Howard, of Atlanta, presented a paper under the title of "The Physiological Progress of the Bone Centers of the Hands of Normal Children Between the Ages of Five and Sixteen Inclusive; Also a Comparative Study of Both Retarded and Accelerated Hand Growth in Children Whose General Skeletal Growth Is Similarly Affected."

This paper involved as large an amount of original research work as has ever been devoted to a subject directly related to orthodontic science. The investigation consisted of a tremendous amount of work done not only by Dr. Howard, but by a number of individuals and groups, without whose co-operation the results could not have been accomplished.

Professor Willis Sutton, Superintendent of the Public Schools of Atlanta, gave his assistance and cooperation to this research. The investigation was carried on in the public schools of Atlanta. Such research could only be accomplished in a city fortunate enough to have a superintendent of schools knowing the importance of oral health, as Professor Sutton does. Professor Sutton has long been recognized as one of the most earnest advocates of oral health, and has done everything to advance the cause in the public schools of Atlanta. His work is attracting attention all over the United States.

The Board of Health of Atlanta also sponsored the work under the supervision of Dr. J. P. Kennedy, Chief of the City Board of Health and Dr. George A. Williams, his assistant.

Fifty boys and fifty girls ranging from five to sixteen years inclusive were photographed, and the total number of pictures made in the public schools amounted to 1412. Added to this, were over 1000 hand pictures already on record at the Good Samaritan Clinic, making a total number of 2412 roentgenographic studies upon which Dr. Howard based his findings. Such a large amount of radiograms could not have been brought together without the assistance of Dr. J. J. Clark, Professor of Roentgenology at the Medical School of Emory University. Mr. J. G. Burnett of the X-Ray Department of the S. S. White Company also cooperated by arranging the equipment in each school.

Besides the assistance of the above mentioned people, this work could not have been carried on without the aid of the Victor X-Ray Corporation of Chicago. This company equipped a CDX machine to be used for this research. The Eastman Kodak Company through Mr. Hodgson of the Medical Division contributed nearly fifteen hundred 8×10 Dupli-Tized Films. The cost of this material alone would have made it impossible for a single individual to carry on this research. It might be of interest to mention that as Dr. Howard expects to carry on this investigation for a period of four to five years, Professor Sutton has agreed to continue his assistance. The Victor X-Ray Corporation have also promised to cooperate further in this work, and are working on special apparatus to be used in the standardization of head pictures, to be made in the study of skull development.

The Victor X-Ray Corporation and the Eastman Kodak Company should receive the thanks of the entire profession for the assistance they have rendered in the conduct of an investigation which promises to be of outstanding importance to the dental and medical professions.

We have long recognized the fact that certain types of malocclusion were directly related to the constitutional development of the individual. This has been especially true in individuals who suffered from retarded or accelerated periods of growth. Just how important these correlated studies will be as a diagnostic factor in determining when orthodontic treatment should be instituted, remains to be seen. There is no doubt but that the development of the teeth and jaws is influenced by general constitutional conditions. Whether or not it will be possible to determine from a hand picture what state of development can be found in the teeth and jaws, has yet to be proved.

A word of caution must be thrown out to those enthusiastic orthodontists who are taking hand pictures in order to determine the advisability of orthodontic treatment. We are willing to admit that it is an established fact that the most ideal time for orthodontic treatment is during the period of accelerated growth. However, to the present time, hand pictures record only conditions as they exist and do not give any indication that the individual is about to go into a period of accelerated growth. It is poor procedure for men to delay orthodontic treatment because an individual shows he has suffered from a retarded period of growth. It is much better to give the individual the benefit of the doubt, and instigate whatever treatment possible to improve his condition, not only along orthodontic lines but along general constitutional lines, including diet and medical care. It must be remembered that orthodontic treatment is only one means to an end; and at the present time, regulating appliances are the most positive method we have for stimulating development.

The orthodontic profession has long realized that mechanical stimulation, as produced by regulating appliances, is more satisfactory in one individual than in another. However, there has never been any definite reason shown by hand pictures to indicate that orthodontic treatment should be delayed when there is a demand for that treatment. Another great danger which may arise from too much enthusiasm among orthodontic radiographers is the use of hand pictures as a final basis of diagnosis. Some are already laying great stress upon the x-ray of the hand as an indication or counterindication for treatment.

You will remember a few years ago when the importance of endocrinology was brought to the attention of the dental profession, some orthodontists became so enthusiastic that every case they examined was the result of endocrine disturbances. We have been consulted by persons who had been to other orthodontists, who had informed them they were suffering from endocrine disturbances. A careful check-up by a competent endocrinologist failed to reveal any such condition.

We are also reminded of a condition existing a few years ago when it was first advocated that every case should have a complete radiographic examination. Some men, in making radiograms of patients at the ages of six or seven years and finding canines and premolars in seemingly impacted positions, advised immediate orthodontic treatment. In some cases orthodontic treatment was begun. In others, where nothing was wrong except the apparently impacted teeth, orthodontic treatment was not instigated. As time passed, these seemingly impacted teeth assumed their normal positions. We are citing these cases simply as a means of advising zealous orthodontists who are x-ray influenced, to remember that a youngster may show a retarded development regarding chronologic age. However, in a changed environment an accelerated growth may be produced in six months to a year, and the underdeveloped youngster will in a short time show a perfectly normal appearance.

The most important fact that Dr. Howard presented is that children pass through periods of retarded and accelerated growth. The accelerated growth period is the ideal time for orthodontic treatment. Beyond that, no other

positive statement can be made at the present time. We must also call attention to the fact that in order to interpret hand pictures, one must acquire years of experience and examine several hundred hand pictures before he can make competent diagnosis concerning the development of the teeth and jaws. To sum it up, hand pictures are only another means of obtaining information that will be of value in the study of development.

The work of Dr. Howard is the most monumental that has ever been conducted along research lines with the idea of establishing the correlation between skeletal growth and growth of teeth and jaws. His work has already proved of great value in relation to early treatment for the prevention of malocclusion.

A few years ago a plan of orthodontic treatment was advocated wherein the expansion of deciduous arches was recommended for patients five and one-half to six years of age who do not show growth spaces at that time. A great many orthodontists began what may be termed the "wholesale expansion" of the deciduous arches with the purpose of stimulating development. This "wholesale expansion" became so universal that the few orthodontists who did not approve of that plan of treatment were considered "back numbers" in orthodontic progress. However, a few men persistently stated that because a child did not show growth spaces at the ages of five and one-half years or six years, was no sign he would not show growth spaces, under perfectly physiologic development, at the ages of six and one-half years or seven years. In other words, a few men recognized at that time, that physiologic growth was more important regarding necessity of orthodontic treatment than was the age of the patient.

Dr. Howard's research work has already established the truth of the latter statement; namely, in those children who fail to show growth spaces at the supposedly proper chronologic age, the x-ray pictures of the hand will also show a retarded skeletal development. In those patients, the mechanical stimulation of a deciduous arch which was otherwise normal, would be contraindicated. However, it must be remembered that those cases in which the permanent teeth are beginning to erupt without sufficient room, orthodontic treatment should be started even if the hand picture does show a retarded skeletal development. We would say not only should orthodontic treatment be begun, but also medical care and hygienic control should be advised for the purpose of stimulating and improving the skeletal development. The two conditions referred to must not be confused with each other or a great amount of harm will result. In other words, the hand picture, as we stated before, is just another aid in our diagnosis and treatment.

Dr. Howard's investigation also shows the impossibility of completing orthodontic treatment before the physiologic age or time. Final growth and arch development must be completed by Nature. A mechanical appliance can only assist in stimulating development. It cannot produce a complete development of an arch at the age of seven or eight years when the physiologic time for that complete development is much later. Orthodontic treatments must keep within the bounds of physiologic growth. To attempt to force it beyond that state is dangerous.

It is our belief that the work started by Dr. Howard and which will be carried on by him and his associates including assistance from the Victor X-Ray Corporation and Eastman Kodak Company will be of untold importance to the orthodontic profession. However, we must again caution the enthusiasts not to apply this research work in such a manner as to produce harm.

Erratum

The last paragraph of the editorial on page 551, June issue, should read:

As the result of elections Dr. Oren A. Oliver was made President-elect, Dr. C. R. Baker, Secretary and Treasurer, Dr. Abram Hoffman, Librarian, and Dr. Paul G. Spencer, member of Board of Censors. The following were nominated for officers and will be voted on: Dr. Harry Kelsey, President-elect, Dr. C. R. Baker, Secretary and Treasurer, Dr. Abram Hoffman, Librarian, and Dr. Henry Clay Ferris and Dr. James D. McCoy, members of Board of Censors.

ORTHODONTIC NEWS AND NOTES

First District Dental Society State of New York

The Morris L. Chaim and The Benjamin Lord Prizes for 1928

The First District Dental Society of the State of New York announces a prize of \$250.00 offered by the Morris L. Chaim Fund and a prize of \$150.00 offered by the Benjamin J. Lord Fund, to be known as the Morris L. Chaim Prize and the Benjamin Lord Prize respectively. These prizes are to be awarded annually at the discretion of the Board of Directors.

CONDITIONS

1. *Eligibility.* Membership in good standing of any bona fide dental, medical, or scientific society, or duly registered student of a recognized educational institution, prior to submission of the manuscript.

2. *Date.* Papers are to be submitted on or prior to November 1, 1928, to the Secretary of the First District Dental Society, 2 East 103rd Street, New York City.

3. *Papers.*

(a) The Morris L. Chaim Prize is offered for the most acceptable paper in the field of science and art as related to dentistry, which paper embodies the results of original research not previously published.

(b) The Benjamin Lord Prize is offered for the most acceptable paper in the field of clinical dentistry having an immediate and direct value in its application to practical needs, which paper embodies the results or original research not previously published.

The manuscript shall be typewritten, and accompanied by all necessary photographs, drawings, diagrams and tables and shall be ready for publication.

The manuscript and all drawings, diagrams, photographs, tables, data, etc., shall be sealed in a plain wrapper or envelope which shall bear on the outside some symbol, group of letters, figures or other identification mark, and accompanying each such sealed packet or envelope, another sealed envelope having on the outside a duplicate of such symbol, group of letters, figures or other mark, and within this sealed envelope shall be placed the name and address of the person submitting the manuscript, etc.

4. *Award.* The award shall be made by the Board of Directors of the First District Dental Society of the State of New York. At the discretion of the Board, the prizes may be divided between the papers adjudged to be of equal merit, or both prizes awarded for one paper, if in the opinion of the judges it merits them.

5. *Publication.* The First District Dental Society of the State of New York will consider the publication of the successful papers, but publication by the First District Dental Society of the State of New York shall not be binding on either party.

6. *Wherever* and whenever published, the papers awarded the prizes shall be accompanied by the statement: "Awarded the Morris L. Chaim or the Benjamin Lord Prize, or both, in 1928, by the First District Dental Society of the State of New York."

Further information may be had by addressing: E. M. Davies, General Secretary, First District Dental Society, New York Academy of Medicine, 2 East 103rd Street, New York City.

